Vol. 132, No. 3 MARCH, 1930 Price 25 Cents

AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry
Including GAS INDUSTRY Est. 1900

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There Must be a Reason!

The Annual Sales of
LUX PURIFYING MATERIAL
have grown steadily from
20,980 tons in 1919, to 65,011 tons
in 1929 or an aggregate total
in 10 years of

525,088 Tons

Write and let us
tell you the reason
for this tremendous
increase in tonnage.

THE ALPHA-LUX COMPANY, Inc.
192 FRONT STREET — NEW YORK

Roll Call of 1929

Becker Type Coke Oven Capacity

During the past year, 682 Becker Type By-Product Coke Ovens were placed in operation or under construction. These ovens will have an aggregate annual carbonizing capacity of over 5,360,000 tons of coal.

PLANT AND LOCATION		No. Ovens	Annual Coal Carbonizing Capacity Net Tons
Bethlehem Steel Company	Johnstown, Pa.	77	570,000
Bethlehem Steel Company	Sparrows Pt., Md.	61	353,000
Davison Coke & Iron Company	Pittsburgh, Pa.	70	630,000
Inland Steel Company	Indiana Harbor, Ind.	74	570,000
Jones & Laughlin Steel Corp.	Aliquippa, Pa.	81	852,000
New England Fuel & Transportation Co.	Everett, Mass.	82	615,000
Philadelphia Coke Company	Philadelphia, Pa.	74	728,000
Providence Gas Company	Providence, R. I.	25	188,000
Rainey-Wood Coke Company	Swedeland, Pa.	41	281,000
Rochester Gas & Electric Corp.	Rochester, N. Y.	37	164,000
Wisconsin Public Service Co.	Sheboygan, Wis.	15	45,000
Wisconsin Steel Company	South Chicago, Ill.	45	363,000

▲▲▲

KOPPERS
Construction Company

Chicago **Pittsburgh** **New York**

Offers a complete engineering service. It is prepared to make competent studies of coke plant projects, recommend, design and build appropriate new or auxiliary equipment and suggest the most efficient operating practice.

Koppers equipment includes . . . Becker Type Oven Plants ◂ Benzol Plants ◂ Gas Producers ◂ Water Gas Plants ◂ Liquid Purification Plants ◂ By-Product Equipment Gas Dehydration Plants ◂ Material Handling Plants ◂ Phenol Removal Plants, Etc.

FOR ECONOMICAL COKE AND GAS PRODUCTION

AMERICAN
GAS JOURNAL
Established 1859 *Pioneer of the Gas Industry*
Including GAS INDUSTRY Est. 1900

Executive and Editorial Offices, 53 Park Place, New York City

S. G. KRAKE, *President and Treasurer* A. M. GLEASON, *Secretary*

H. M. RILEY, *Editor*

R. S. McBRIDE, *Consulting Editor*, Washington, D. C.

Vol. 132, No. 3 March, 1930 Whole Number 3675

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AMERICAN GAS JOURNAL, March, 1930, Vol. 132, No. 3 Published monthly by American Gas Journal, Inc., at 34 Crystal St., East Stroudsburg, Pa. Executive, Editorial, and Business offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 17, 1928 at the postoffice of East Stroudsburg, Pa., under the Act of March 3, 1879.

Subscriptions $2.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada $3.00; foreign $4.00. Single copies 25 cents.

JAMES T. HEED, *Advertising Rep.* *343 So. Dearborn St., Chicago, Ill.*

JOSEPH M. CONNER, *Eastern Rep.* *53 Park Place, New York*

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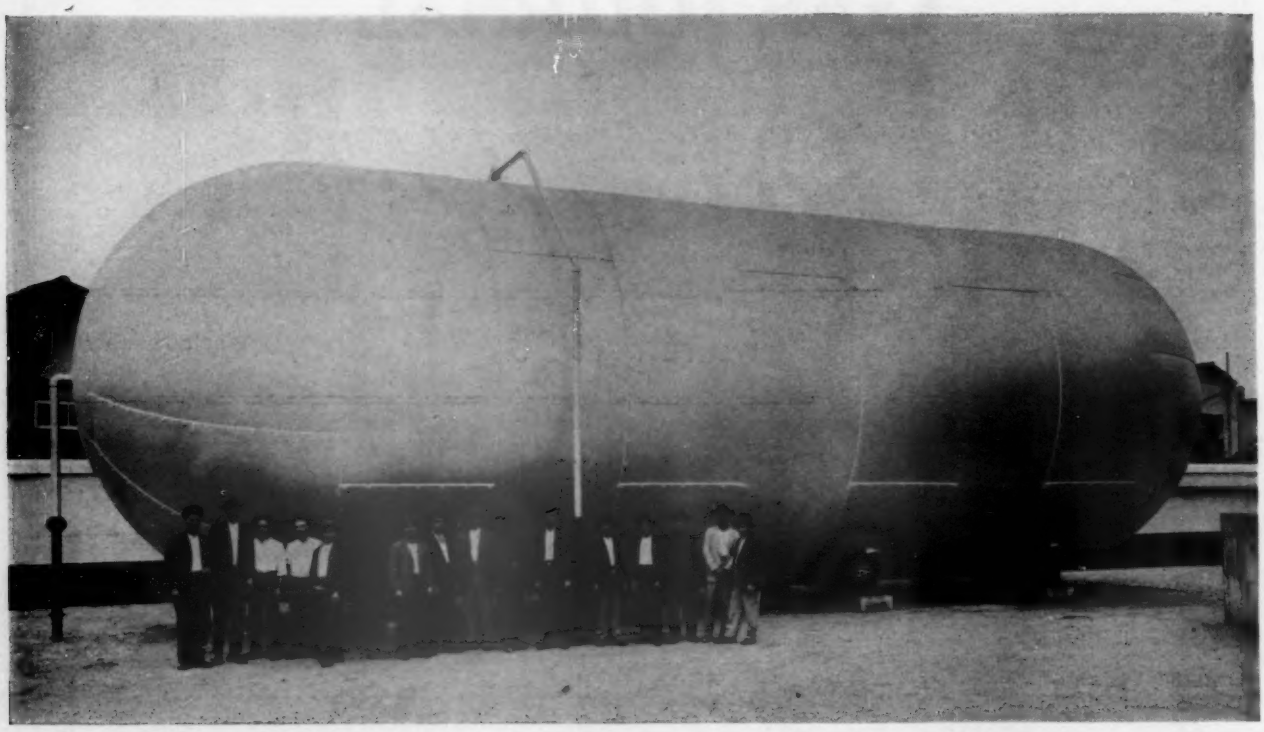
The Builders of Stacey Holders for Over 79 Years



High pressure gas holder designed and furnished by The Stacey Manufacturing Company for the City of Santos Improvement Co., Santos, Brazil.

An Example of Shop Accuracy

This holder of welded construction throughout, operated at 50 pounds working pressure, was designed and fabricated in the Stacey Manufacturing Company's plant in Cincinnati, Ohio, and shipped across the equator to Santos, Brazil, where it was assembled and welded by the local gas company engineer using local labor.

Each part of the assembled tank fitted perfectly, demonstrating the accuracy of our shop fabrication.

An order for a duplicate holder has been received and is now under construction in Santos, Brazil.

We will be glad to serve you as well.

High and low pressure gas holders to meet your requirements

THE STACEY MANUFACTURING CO.

ENGINEERS AND BUILDERS

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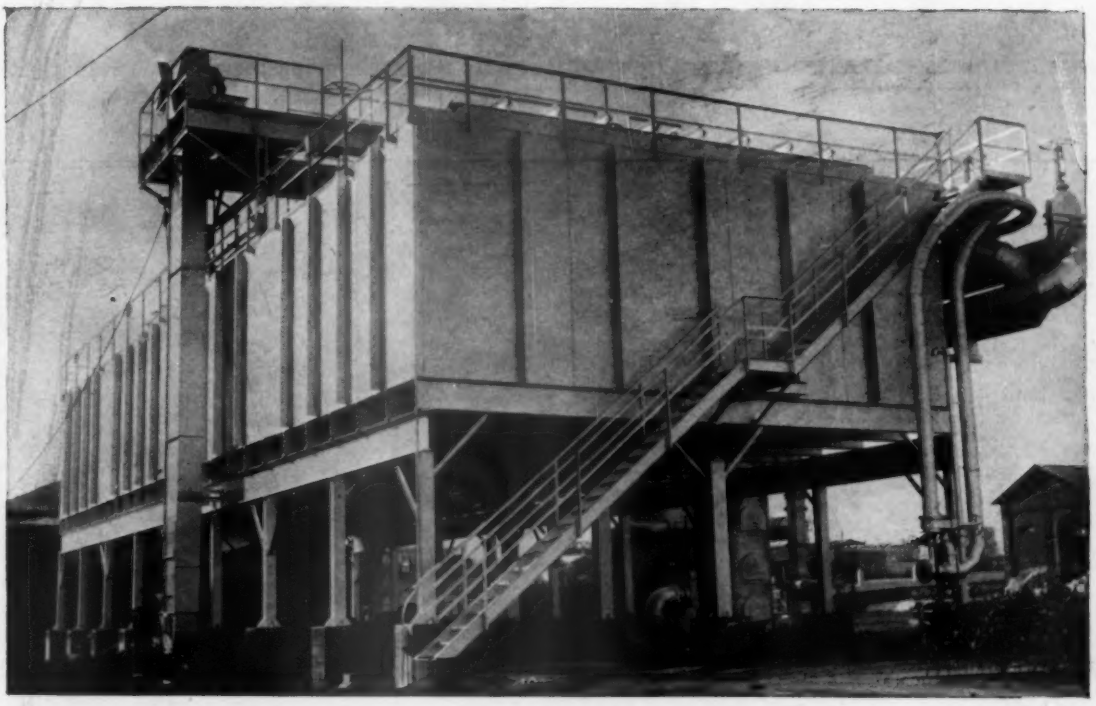
GEO. H. CRESSLER, *General Sales, Mgr.*
A. A. RANSHAW, *Vice-President.*
W. D. BIRBECK, *Sales Engineer.*
A. E. HARVEY, *Sales Engineer.*
EDW. J. BAECHLE, *Secretary and Treasurer.*
FRANK O. PANDORF, *Chief Engineer.*

CINCINNATI, OHIO

NEW YORK OFFICE:
52 Vanderbilt Avenue

STACEY
SINCE 1851

PURIFIERS



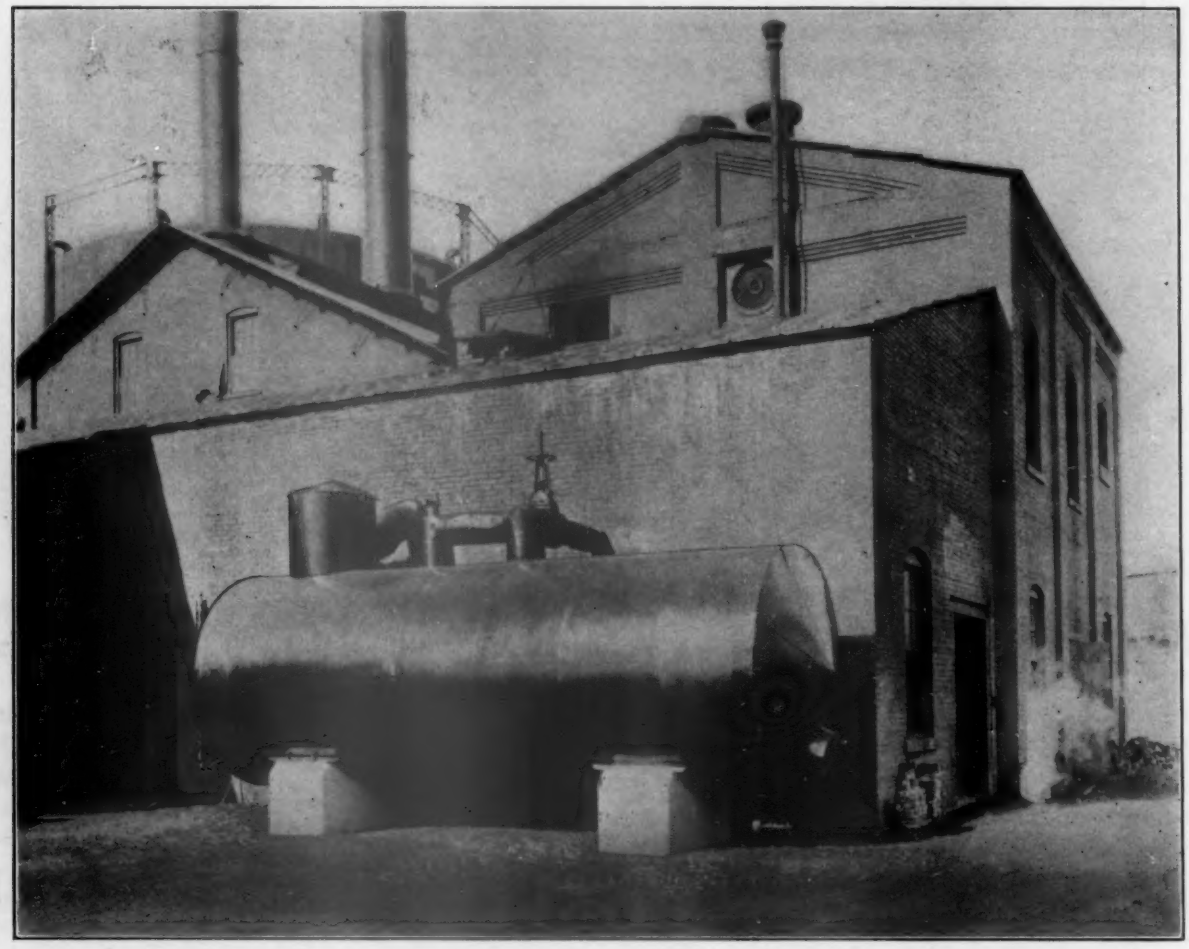
THIS four-compartment purifier was built by the SEMET-SOLVAY ENGINEERING CORPORATION at Havana for the Campania Cubana de Electricidad. Material was shipped direct and fabricated by electric arc welding on the site, resulting in important saving to the customer.

Semet-Solvay Valves, Reversing Gas Manifold, an air piping system for revivifying oxide, elevator and cover handling equipment are designed for efficient and enduring service. Trays are of exclusive patented construction, having no metal fastenings.

Semet-Solvay Purifiers of all types are the standard of comparison for the gas and by-product industries.

SEMET-SOLVAY
ENGINEERING CORPORATION
Division Allied Chemical and Dye Corp.
40 RECTOR ST. NEW YORK

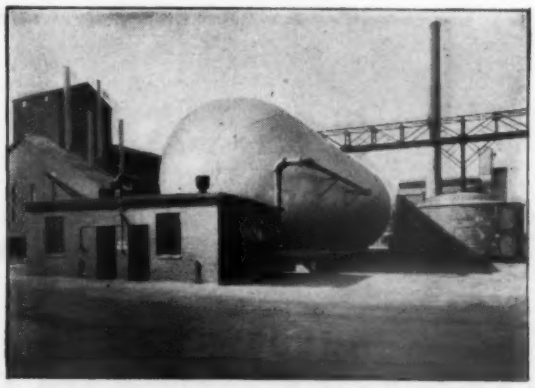
SMOOT STEAM ACCUMULATOR



The Public Service Company of Northern Illinois, has installed this Smoot Exhaust Steam Accumulator at their Ottawa plant. This modern practice causes the steam driven blowers, etc., to become "reducing valves" between the boiler and the gas generators and this power is thus secured at almost zero cost.

SMOOT ENGINEERING CORPORATION
136 Liberty Street **New York**

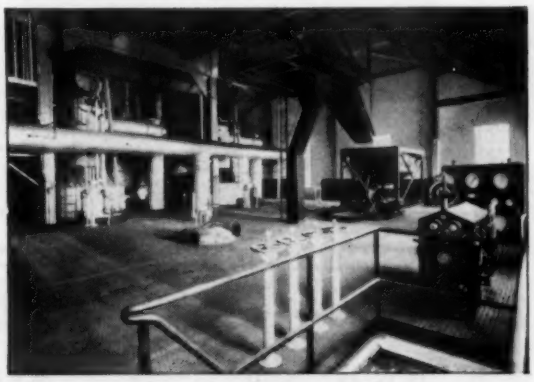
SMOOT CONTROL



High Pressure Holder and Regulating House

Generator House and Condenser

U. G. I. REFORMING PROCESS *. . . at Chester*

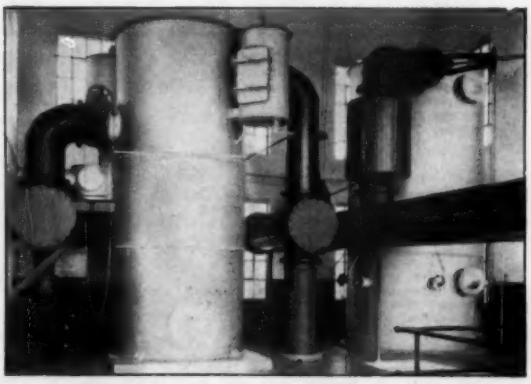


Operating Floor of Mechanical Generator Water Gas Sets

THE U. G. I. Reforming Process utilizes refinery oil gas of high heating value and high gravity to produce a gas of standard heating value and low gravity.

In the Plant of the Philadelphia Electric Company at Chester, Pa., refinery oil gas of 1500 B.t.u. with a gravity of 1.0 is reformed to give finished gas with a heating value of 530 B.t.u. per cu. ft., with a gravity of .53.

This process was developed by the U. G. I. research organization and is now available for gas company use.



Cottrell Precipitator and Napthalene Scrubber

THE U. G. I. CONTRACTING COMPANY

DIVISION OF

UNITED ENGINEERS & CONSTRUCTORS

INCORPORATED

DWIGHT P. ROBINSON, PRESIDENT

Philadelphia
Broad and Arch Streets

Chicago
Conway Building

MAXIMUM RETURN TO CLIENTS PER DOLLAR INVESTED

NOW REFRACTORIES LAST 4500 HOURS IN THE CLINKER ZONE

R & E
CEMENTS
for
GAS PLANTS

R & E # 3000

You can't find a better cement for all-around service in gas plants. R & E #3000 air-sets to full strength; retains its bond; makes brick dislodgement impossible when "barring down;" will not crumble. Unusual adhesiveness makes #3000 extremely efficient for hot or cold patching. Fine texture permits extremely thin joints which, together with its excellent bond, is a further safeguard against bricks "pulling out." #3000 will not bloat or puff at low temperatures; does not crumble or fall when equipment is "off the line." Withstands temperatures in excess of 3000 F. Conveniently shipped ready for use in plastic form in 100 and 500 lb. steel drums. Try a drum today.

"Moldit"

We recommend Moldit for such work as monolithic floors, checker work and arches. It avoids delays in waiting for special tiles or brick. Just add a little fresh water and mold it into any desired shape. Moldit "air-sets" and attains full strength without heat. It does not shrink and meets the most severe requirements of modern construction. You can use Moldit under temperatures up to 3000° F. It's easy to use, too. Add a little fresh water and pour—no ramming, no hammering—just mold it. Weighs only 100 lbs. molded. Shipped in convenient 100 lb. waterproof bags.

"Moldit-A"

Use Moldit-A for service under temperatures between 200° F. and 2400° F. It works the same as "Moldit" and can be used for monolithic floors, standpipes, doors, etc., any place where great structural strength is essential, or desired. Like other R & E Cements, Moldit-A air-sets and gains full strength without heat. It weighs approximately 100 lb. per cubic foot and is shipped in 100 lb. handy waterproof bags.

Order a few bags on trial today.

There's nothing "hypothetical" or "theoretical" about R & E #3000 Refractory Cement when it can increase refractory life from 1500 average hours to 4500 average hours in the clinker zone of water gas machines.

R & E #3000 has done just that in one of the county's largest gas plants. It can do the same for you ---why not use it?

REFRACTORY & ENGINEERING CORPORATION

Engineering & Manufacturing Specialists in High Temperature Cements

50 Church St., New York, N. Y.

Pittsburgh Baltimore Philadelphia Chicago

R&E #3000

Looking Ahead!

AGREED . . . the present outlook for the gas industry is most propitious, but how about the equipment and operating efficiencies with which you are going to meet this increased favorable business?

You are seriously handicapped if there is any indication of equipment *lameness* or operating *blindness* in your plant, but whatever is necessary and required to enable you overcome these conditions and to meet the increased demands and enjoy the most profitable production, we can not only help you plan your program to do so, but can carry it through to a satisfactory and economical completion.

Our broad experience in designing, building and operating coal carbonizing plants; our long and thorough training in this one field of endeavor; our vast reservoir of knowledge of this subject and our unusual engineering facilities especially fit us to serve you.

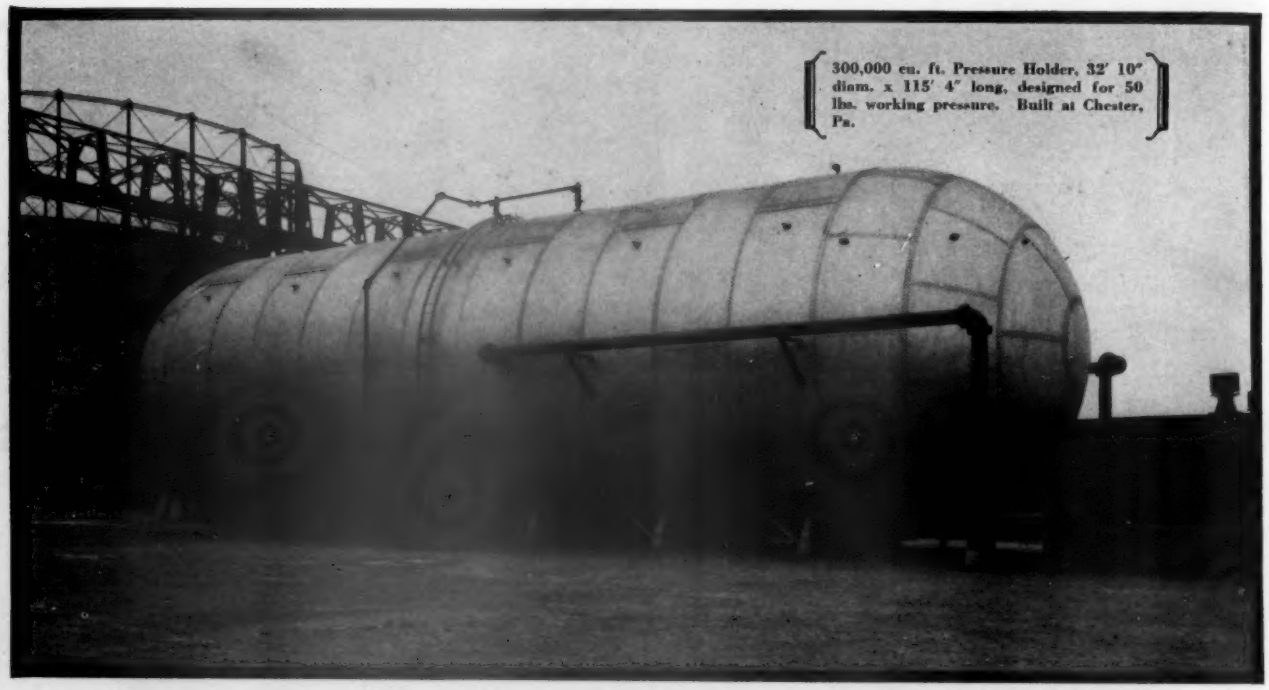
Helpful, practical counsel, worthwhile suggestions and recommendations, and quick satisfactory action on any project, large or small—pertaining to coal gas manufacture.

for more than 25 years
anticipating the needs of the gas industry

MAIN OFFICE — 24 STATE STREET,
BATTERY PARK BLDG., NEW YORK

BRANCH OFFICE—205 W. WACKER DRIVE
ENGINEERING BLDG., CHICAGO, ILL.

IMPROVED EQUIPMENT-RUSSELL ENGINEERING CORPORATION
ENGINEERS *BUILDERS*
NEW YORK CHICAGO



300,000 cu. ft. Pressure Holder, 32' 10" diam. x 115' 4" long, designed for 50 lbs. working pressure. Built at Chester, Pa.

TWO NOTES about this *new* GAS HOLDER

First: **that in the construction of this 300,000 cu. ft. Holder, the standard Cruse-Kemper practice was followed of *calking every inch of the way*;**

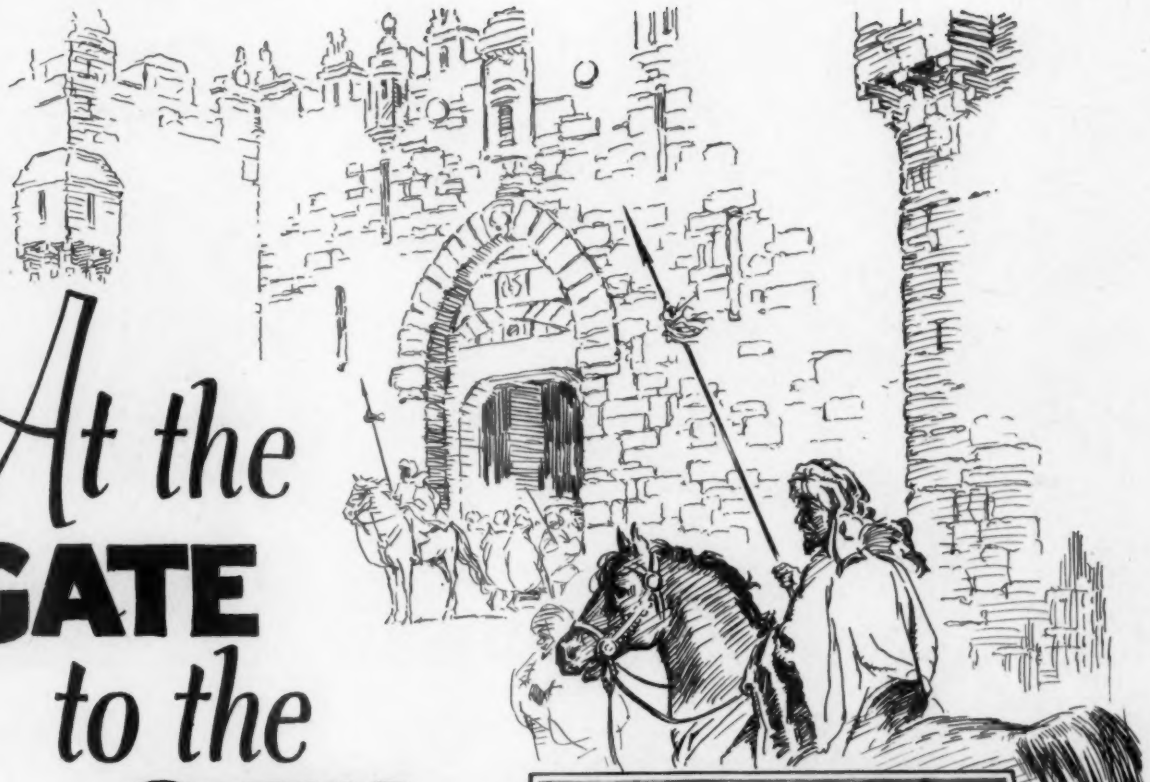
and ***Second:*** **that once the tank was calked in assembly it was gas tight at the working pressure of 50 lbs.! It was not necessary to re-calk the holder after gas was put in!**

This care in assembly will be used on your next major installation by Cruse-Kemper.

CRUSE-KEMPER CO.

AMBLER, PA.

Manufacturers of GAS HOLDERS and other major equipment units for the GAS INDUSTRY



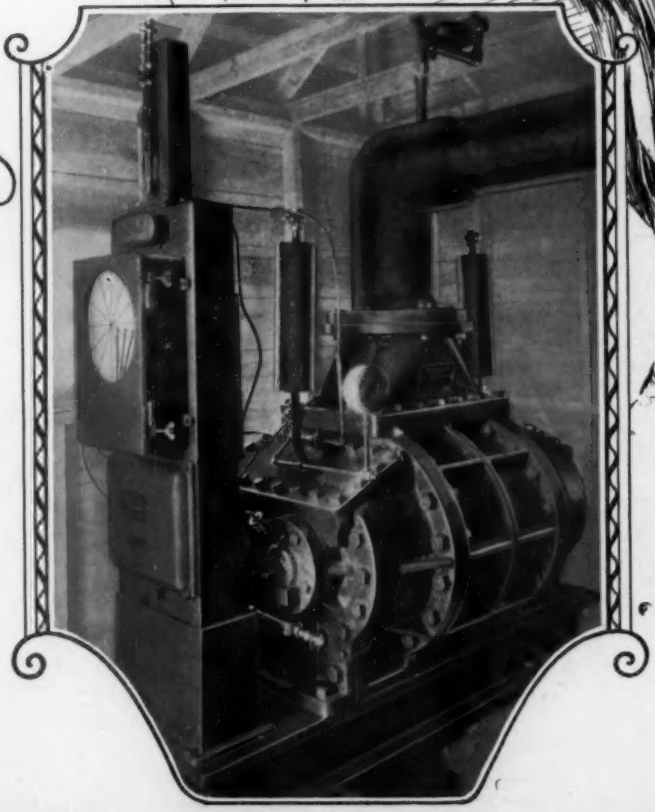
At the **GATE** *to the* **CITY**

the
CONNERSVILLE METER
is a
dependable recorder
of
gas flow

Bulletin 305 shows other typical installations.

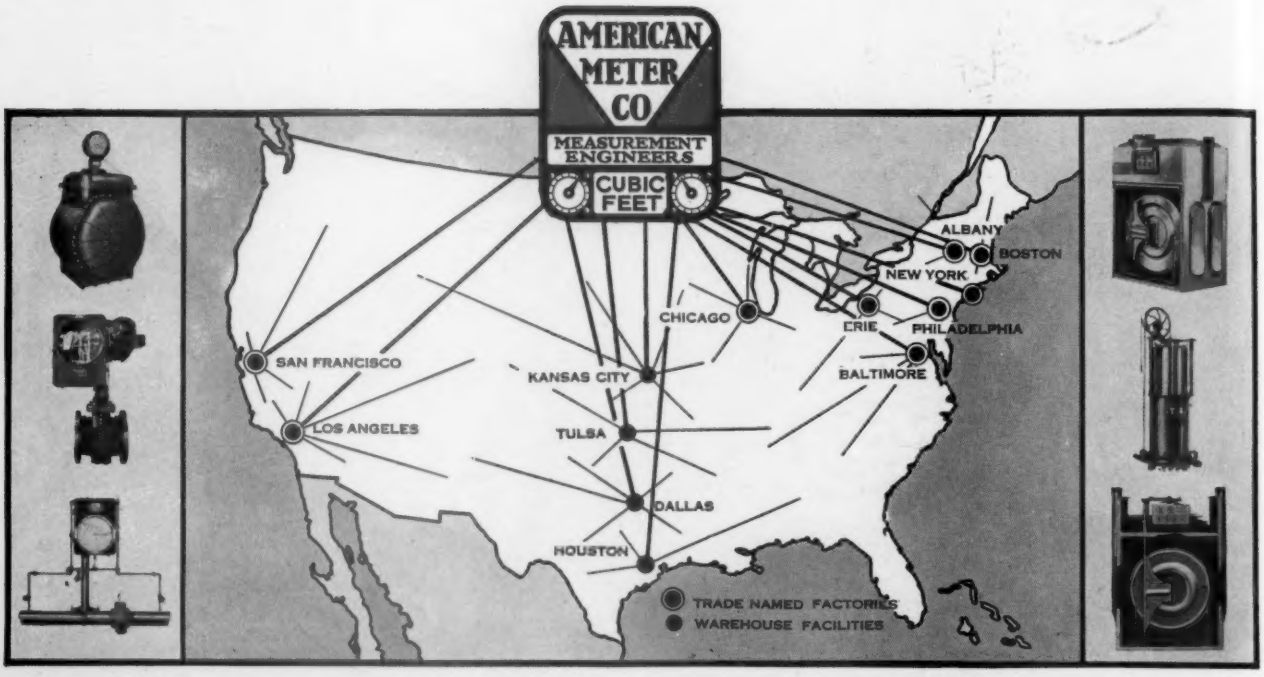
THE CONNERSVILLE BLOWER COMPANY, INC.,
12th St., & Columbia Ave.,
Connersville, Indiana.

Sales Offices
53 W. Jackson Blvd., Chicago
114 Liberty Street, New York



CONNERSVILLE

Blowers • Gas Pumps • Meters • Cycloidal Pumps



Conveniently Located Factories

American Meter Company
New York
Established 1836

American Meter Company
Chicago
Established 1896

John J. Griffin & Company
Philadelphia
Established 1859

Holme & McIlhenny
Philadelphia
Established 1840

supported by nation-wide experience and facilities

Ninety-four years ago — shortly after the first gas plant was founded in this country — American Meter Company opened its first factory. Today American Meter Company supplies the gas industry from ten trade-named factories strategically located from coast to coast.

Each factory is an integral part of a comprehensive manufacturing organization, supervised by trained engineers. Each American Meter is made to the highest standards of accurate measurement and economical service.

Old Types Improved
New Types Developed

A pioneer in the manufacture of gas meters, American Meter Company is still pioneering in the development of improved gas measuring and testing apparatus.

With increasing experiment and intensive research, the engineers of American Meter Company are constantly improving established meters, and developing new equipment to meet new requirements.

Many Branches Provide Intensive Local Service

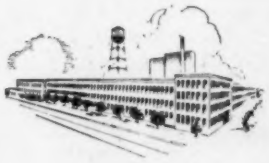
The geographical distribution of American Meter Company branches assures quick delivery and prompt engineering and shop service. It also permits an intensive knowledge of local conditions and their specific requirements.

Whenever you have a meter problem call in an American Meter Company representative. He will gladly bring to its solution a personal interest, supported by the experience of extensive laboratory experiment and of gas measurement practically applied in every part of the country.

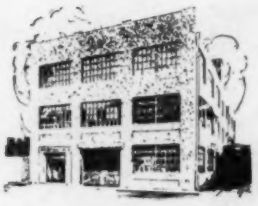
"Gas Measurement Engineering," a periodic publication of American Meter Company will be of interest to you—also the complete index to this Company's other printed information. We will be pleased to place your name on our mailing list.

D. McDonald & Company
Albany
Established 1855

Maryland Meter Works
Baltimore
Established 1866

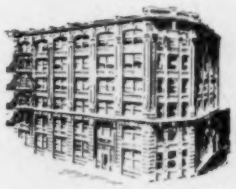


Metric Metal Works
Erie, Pa.
Established 1888



Pacific Meter Works
Los Angeles
Established 1901

Pacific Meter Works
San Francisco
Established 1901



Nathaniel Tufts Meter Works
Boston
Established 1860

AMERICAN METER CO
MEASUREMENT ENGINEERS
CUBIC FEET

AMERICAN METER COMPANY

Incorporated

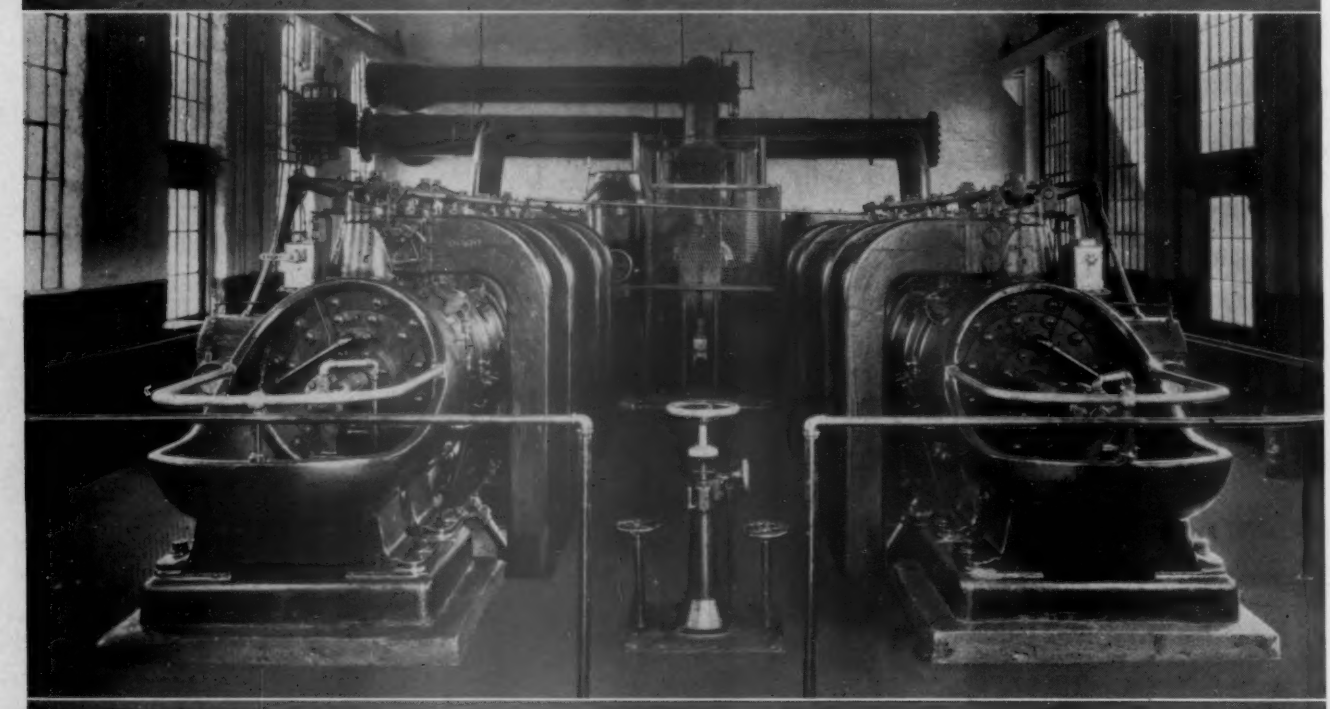
General Offices: 105 West 40th Street, New York, New York . . . . Established 1836

THE WORLD'S LARGEST MANUFACTURERS OF GAS METERS AND ALLIED APPARATUS

SALES ALBANY · BALTIMORE · BOSTON · CHICAGO · DALLAS · DENVER · ERIE · KANSAS CITY
SERVICE LOS ANGELES · NEW YORK · PHILADELPHIA · PITTSBURGH · SAN FRANCISCO · TULSA

CHOSEN FOR DEPENDABILITY
CHOSEN FOR ECONOMY

COOPER-BESSEMER

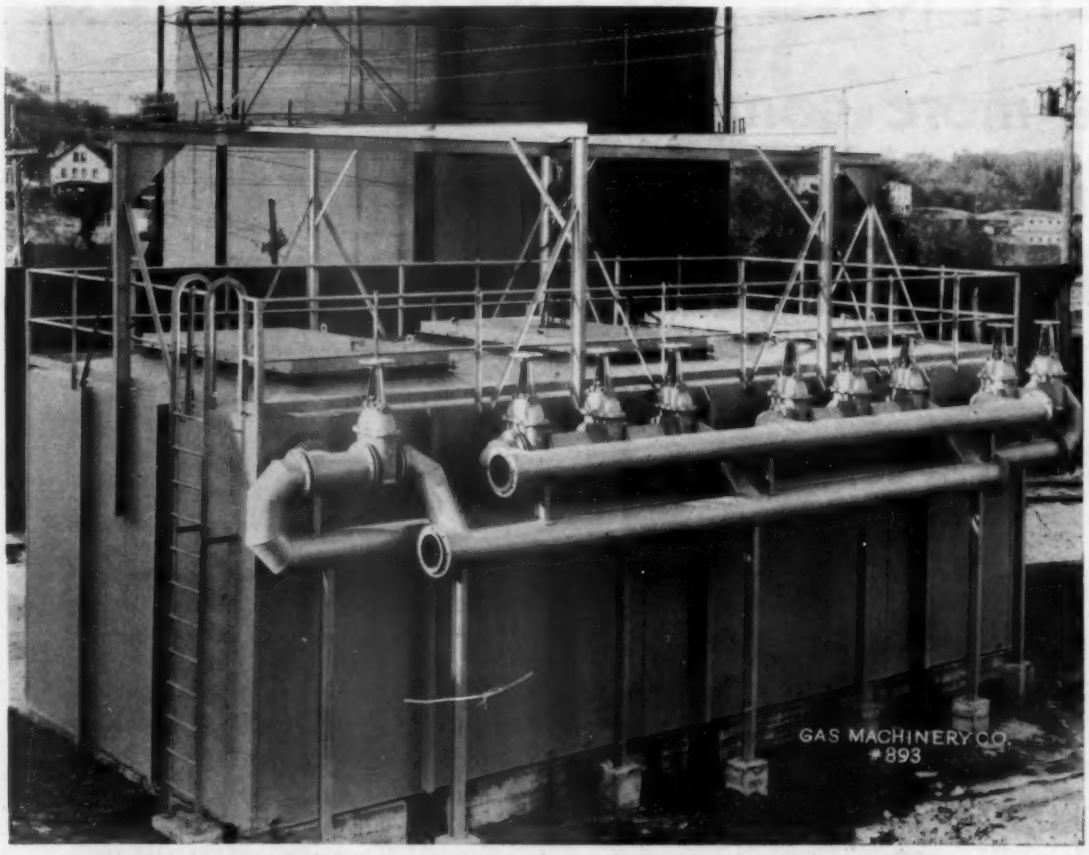


Manufactured gas men know what happens to the service when power to a rotary blower or to a positive displacement compressor fails. They know the high cost of maintaining a stand-by steam plant—and the maximum demand charge for current to a distributing station where the load factor is low. That is why Cooper-Bessemer gas engines are chosen. *Write for facts and figures.*

THE COOPER-BESSEMER CORPORATION
Formerly The C. & G. Cooper Co. and The Bessemer Gas Engine Co.
Mount Vernon, Ohio Grove City, Pa.
Branch offices in all principal cities

ARC-WELDED STEEL PURIFIERS

Insure Low Investment Costs and Satisfactory and Efficient Removal of Sulphur



The purifiers shown in above halftone were recently completed for a rapidly growing eastern company.

The structure is divided by two partitions into three purifier boxes and the flow of gas is controlled by the valve manifold designed to permit the flow of gas thru the several compartments in the following rotation:

A, AB, ABC,
B, BA, BAC,
C, CA, CAB,

and any one section may be cut out for cleaning and filling.

The reinforcement of the top deck and the covers is all on the underneath side, thus insuring against pockets for water to lodge in and cause depreciation by rusting.

Unloading is facilitated by three self-sealing side doors, each 3′ 8″ wide x 11 high, (one in each compartment).

We shall be pleased to quote on your requirements.

THE GAS MACHINERY COMPANY

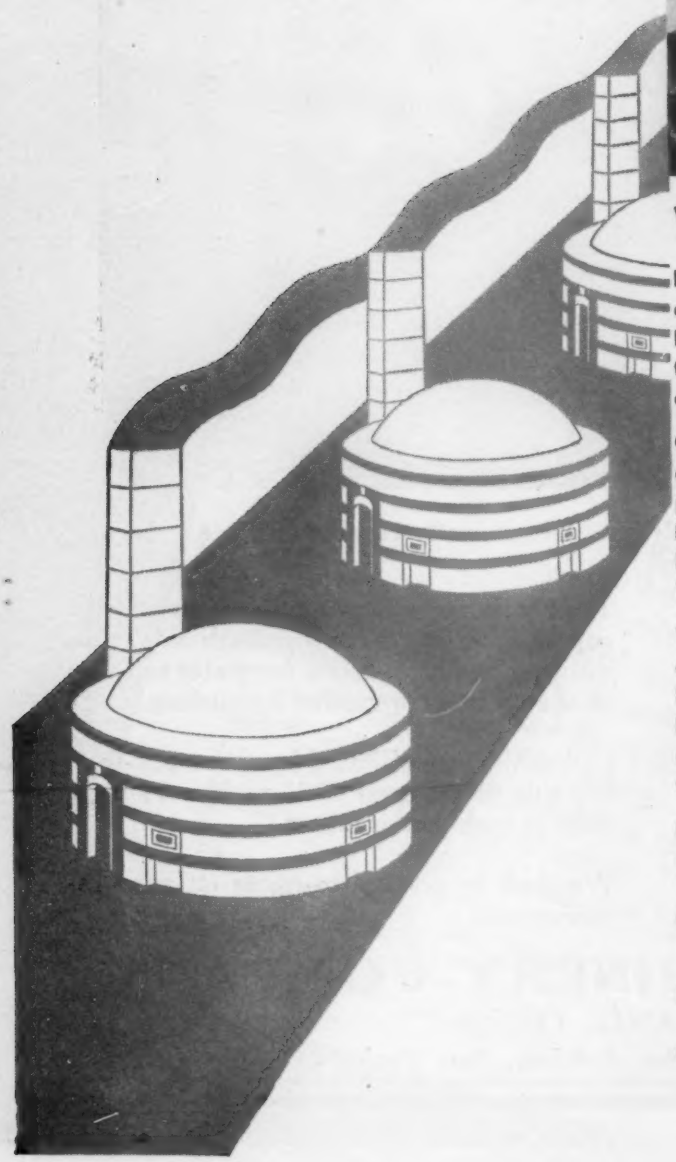
CLEVELAND, OHIO

Eastern Office: 812 Graybar Building, New York City

NOW EVENS & HOWARD is a part of GENERAL REFRACTORIES

.. a more complete refractory service than ever before ..

EVENS & HOWARD PLANTS,
recently acquired by General Refractories Co.



WITH the acquisition of the refractories properties of the Evens & Howard Fire Brick Co., comprising three large, modern plants at St. Louis, Mo., and Stevens Pottery, Ga., General Refractories Co. offers to refractory users throughout the country a more complete service than ever before.

General Refractories now offers you more extensive manufacturing facilities with 18 plants distributed in Pennsylvania, Maryland, Kentucky, Illinois, Missouri and Georgia, having a combined capacity of nearly 1,200,000 brick per day.

The well known Evens & Howard brands will continue to be manufactured by General Refractories and will benefit by the G. R. knowledge of refractory requirements and research facilities that have already proved their worth.

It is our constant aim to produce refractories best suited for individual requirements.

GENERAL REFRACTORIES COMPANY

106 South 16th St., Philadelphia, Pa.

Boston Buffalo Chicago Cleveland
Detroit Indianapolis New York
Pittsburgh St. Louis San Francisco

Evens & Howard Division:—St. Louis, Mo.

3582

BUTANE

for Gas Manufacture
Gas Enrichment
Peak Load Control

GRADE
G 4
PHILFUELS

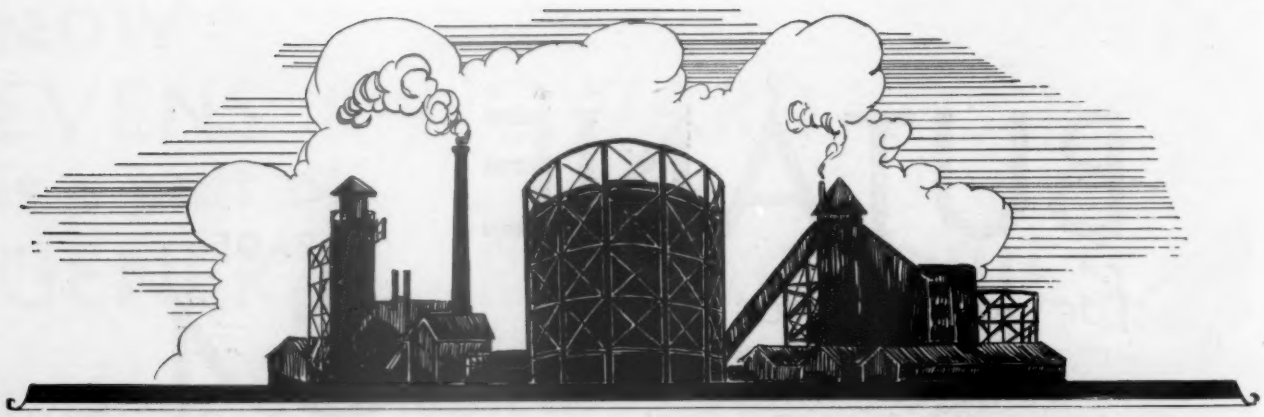
The
PHILFUELS PROCESS
Offers to the Gas Industry Many Advantages

Reduced Plant Investment
Long Term Protection on Fuel Prices and Delivery
Minimum Labor Costs with Automatic Control
Low Power and Maintenance Costs
100% Thermal Efficiency Independent of Time Factor
Gas of Constant Calorific Value and Unusual Purity
Extreme Flexibility to Meet All Load Conditions
Standard Units Available for Prompt Delivery

The Following Communities are Supplied with Gas Manufactured by the Philfuels Process

Calais, Maine
Cleveland, Tenn.
Harrisonburg, Va.
Linton, Indiana
Watertown, S. D.
Mapleton, Iowa
No. Manchester, Ind.
Shenandoah, Iowa
Sheridan, Indiana

PHILFUELS COMPANY
Subsidiary of Phillips Petroleum Company
General Motors Bldg. Detroit, Michigan
Gas Manufacturing Division



BRISTOL'S RECORDING INSTRUMENTS SIMPLIFY OPERATION CONTROL

Bristol's Controller Adds Savings of Water and Labor to Efficient Purification

Savings of both labor and water are added to the efficiency of condensation and purification when a Bristol Automatic Temperature Controller is installed on every condenser.

With the actuating bulb located in the outlet of the condenser and connected with the water supply valve, the Bristol Controller automatically adjusts the flow of water in the condenser. It eliminates hand control of the valve and prevents water from being wasted. At the same time, the operator is always sure that the gas in the condenser is being maintained at the correct temperature for proper condensation and purification.

Elsewhere in the purification process, Bristol Instruments render equally valuable service. For there are numerous places where temperatures and also pressures must be kept within narrow limits for a proper cleansing of the gas. The same applies for the carburetted water gas machine and the distribution system.

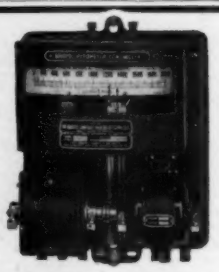
Wherever Bristol Instruments are correctly employed, you reduce expenses and secure smoother operation. Always furnishing dependable records, they stand up under the hardest operating conditions. They are simple in design, rugged in construction, dust, fume and moisture proof.

Bristol's Automatic Temperature Controller.

TRADE MARK
BRISTOL'S
REG. U.S. PAT. OFFICE

The Most Extensive Line of Recording Instruments and Automatic Control Equipment.

Pressure Gauges for both permanent mounting and portable test work; Vacuum Gauges, Liquid Level Gauges, Thermometers, Pyrometers, Psychrometers, Voltmeters, Ammeters, Wattmeters, Electrical Operation Recorders, Mechanical Motion Recorders Tachometers, etc. Also Automatic Control Equipment and Controller Valves for controlling temperature pressure, liquid flow, liquid levels, etc., etc.



The Bristol Prometer Controller meets the requirements for automatic regulation of high temperatures

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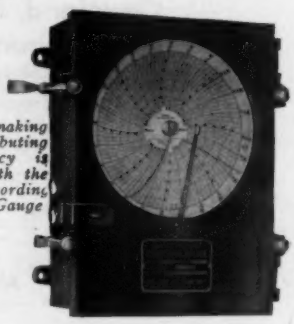
The proper application of Bristol Instruments to gas making and distribution is a task for our sales engineers. With a wide experience to aid them in making recommendations, these specialists will gladly make a survey for you. No obligation is involved. Write today for a survey.



In both making and distributing gas efficiency is improved with the Bristol Recording Pressure Gauge

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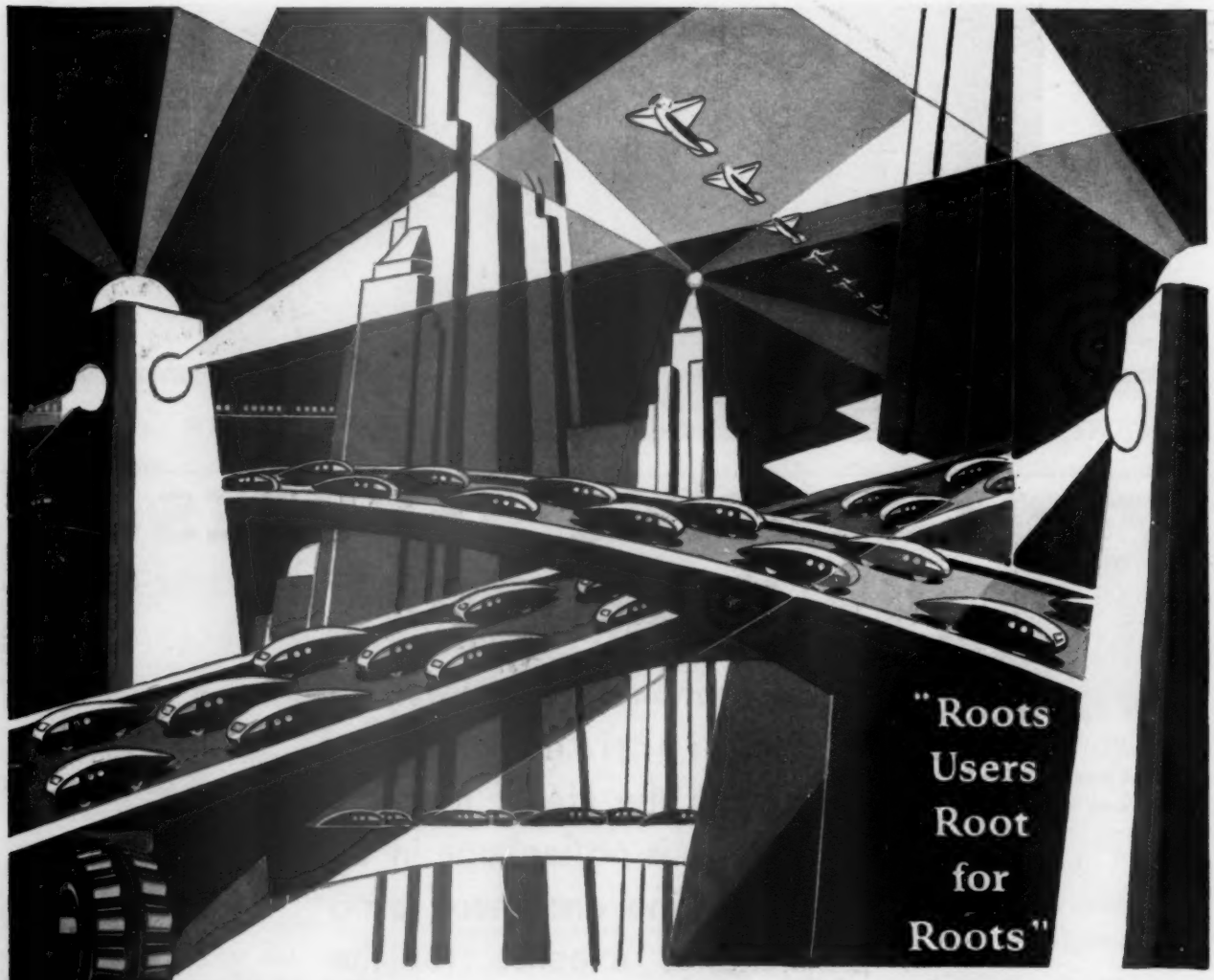

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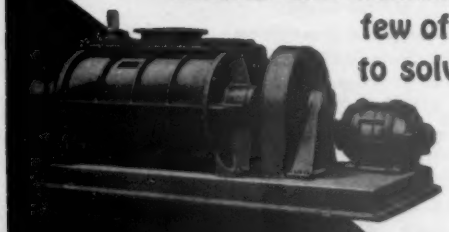
The Roots of Future Cities-

Growing cities of the future will increase the demand for Roots Meters, Gas Pumps, Liquid Pumps, Vacuum Pumps and Blowers. ¶ New ventilating, conveying, transporting, vacuum heating and cleaning and sewage disposal methods are only a few of the problems that Roots Units will be called upon to solve. ¶ Roots not only keeps abreast of the times – we think ahead. Let us straighten out your difficulties while they are still in the paper and plan stage. Our booklet 10-B1 will give you the idea in general.



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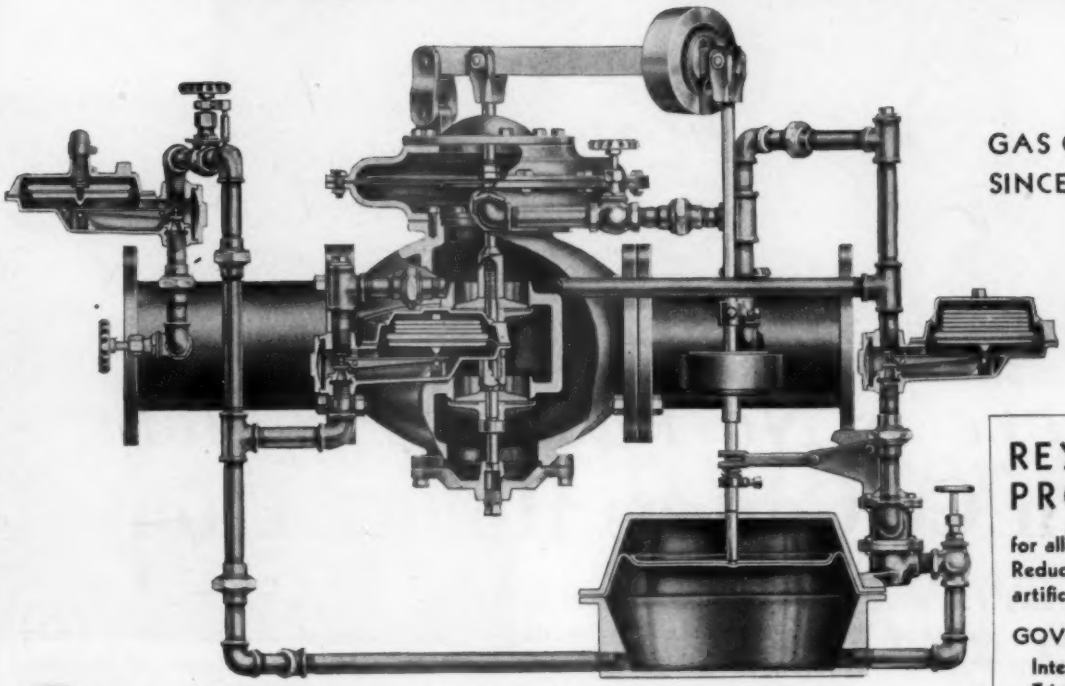
REYNOLDS Single District Station Regulator Equipped with the ...Reynolds Automatic Loader



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PEAK LOAD EFFICIENCY

The difference between Peak Load and Peak Load Efficiency is—absolute pressure control with uniform gas flow. This difference is essential for positive gas regulation. Install a Reynolds District Station Regulator equipped with a Reynolds Automatic Loader and make this difference your gain.

Write for complete details and check the advantages of a Reynolds System before you specify or install your units.

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for all kinds of Pressure Reductions—for either artificial or natural gas.

GOVERNORS—
- Intermediate Pressure
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Reynolds
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«REPRESENTATIVES» Eastern Service Company, Boston, Mass. F. E. Newberry, Avon, N. J.
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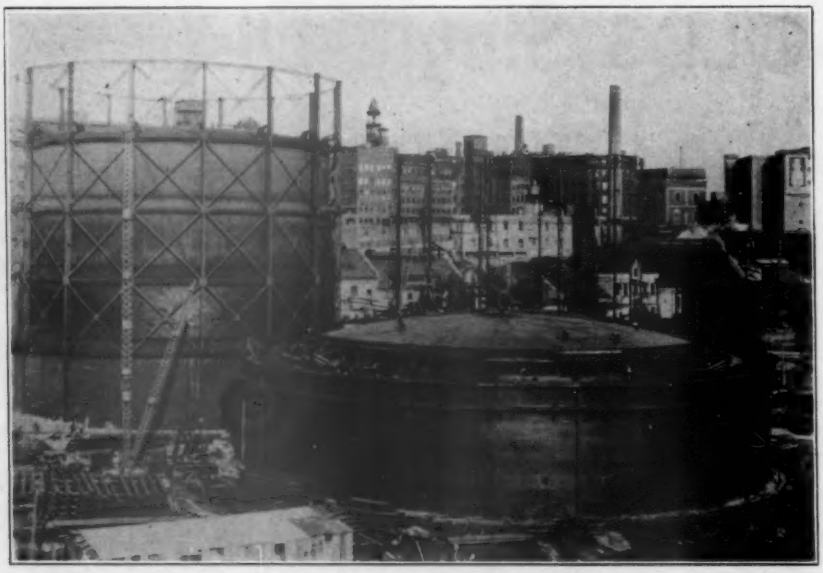

New 5,000,000 cubic foot holder (No. 11) of the Rochester Gas & Electric Corp., Rochester, N. Y., CE-CO Holder Paints are protecting all the Holders of this company

There is No Paint "Problem" with Ce-Co Gas Holder Paints

We repeat: "There *is No* Paint 'Problem' " in protecting gas works structures. We have worked out for you adequate protection and also beauty in Ce-Co Technical Paints.

The question then, merely resolves itself into—"Which *color tone* will best harmonize with our environment?" *That's all.*

It matters not which *color* you select, there's a Ce-Co Gas Holder Paint that will answer your specific purpose; the *protection* is inseparably mixed in each batch by our improved method of manufacture, based on formulae that have stood all tests for over half a century.

These high quality, dependable, Ce-Co protective coatings for gas holders are made in various shades which merge into the color scheme of the surroundings and dispel the ugliness of the great mass of steel so objectionable in some localities.

These standard shades are:—No. 31 Williamsport Red, Beige, Stainless Drab, Public Service Drab, Public Service Gray, Low Visibility Gray, etc.

For longer service, better protection and lasting good appearance of your holders, use and specify to your painting contractor, Ce-Co Gas Holder Paints. And so that you may know these paints better, send the coupon below.

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Established 1876
TECHNICAL PAINT MAKERS
639-647 Kent Avenue — Brooklyn, N. Y.
Works at Brooklyn, N. Y. and Williamsport, Pa.

Send This Coupon To-Day!

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We want to preserve and beautify our gas holders. Send literature and color cards telling us how this can be done.

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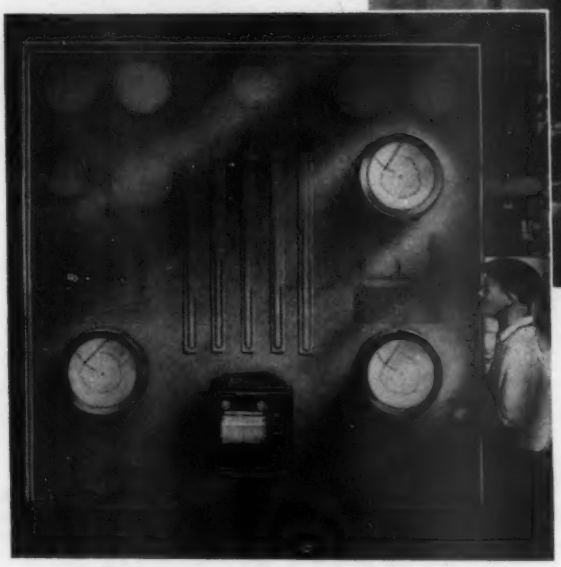


A few of the more than 70 Brown Instruments at the plant of the Philadelphia Coke Co.

Producer Gas

for Diluting Coke Oven Gas

EFFICIENT operation characterizes the plant of the Philadelphia Coke Co., Philadelphia, Pa.

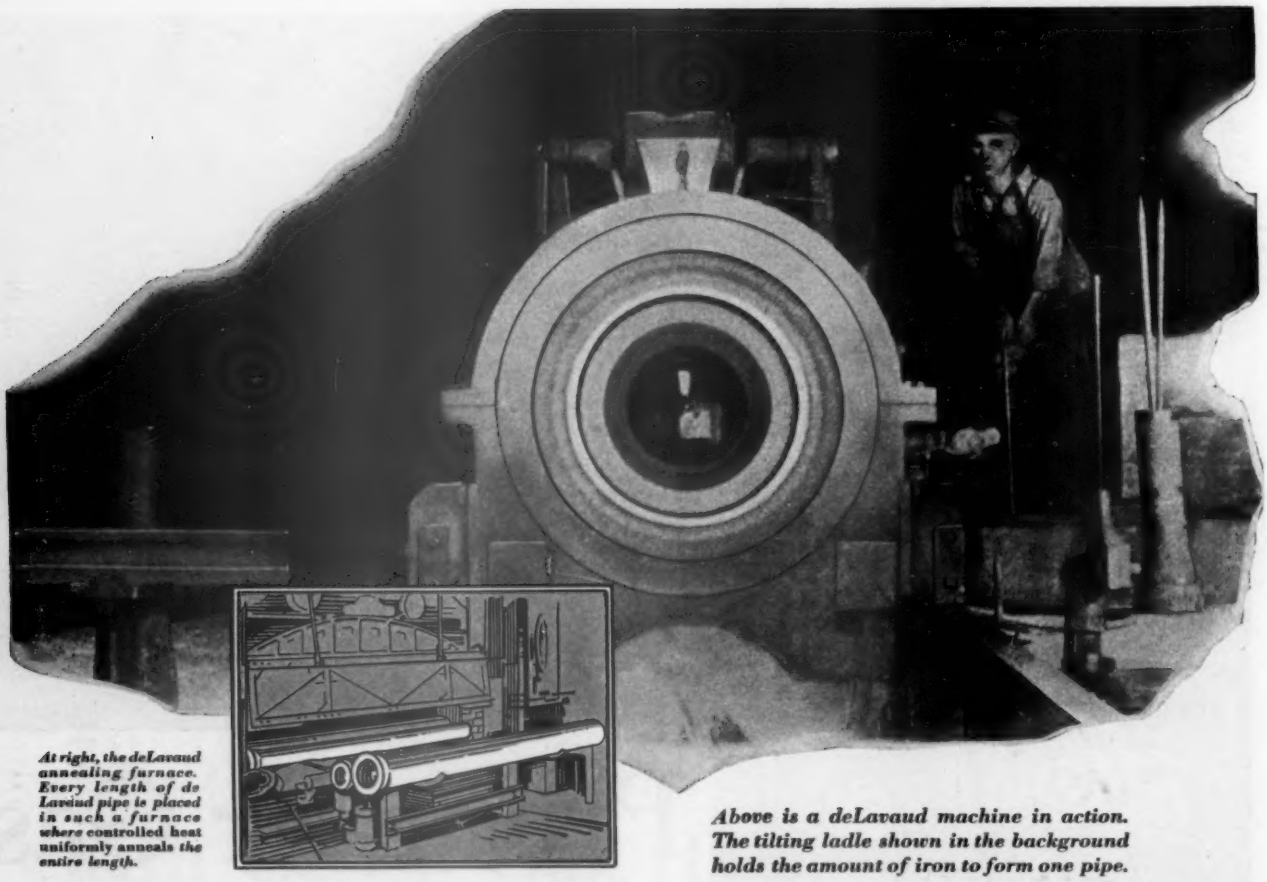
Accurate, permanent records, such as are produced by Brown Instruments, govern all processes there—ovens, producers and power house.

Have the Brown Engineering Service make suggestions regarding instruments in gas production. Write for full details or quotations, or have an Engineer call.

THE BROWN INSTRUMENT COMPANY
4473 Wayne Ave., Philadelphia, Pa.
Branches in 20 principal cities

Brown Instruments

"*to measure is to economize*"



At right, the deLavaud annealing furnace. Every length of deLavaud pipe is placed in such a furnace where controlled heat uniformly anneals the entire length.

Above is a deLavaud machine in action. The tilting ladle shown in the background holds the amount of iron to form one pipe.

Sturdy, Flexible deLavaud pipe is always uniform in thickness

No chance of deLavaud pipe being "sided." A physical law assures the uniform thickness of the pipe walls. deLavaud pipe is made by pouring molten iron into a rapidly revolving cylindrical metal mold. The revolving action holds the iron against the mold with a force which at all points is equal to 40 times the force of gravity.

Immediately after coming from the machines, every length of deLavaud pipe is annealed in an oven where temperatures are accurately controlled. This controlled annealing is responsible for the flexibility of the pipe metal. It is the reason why deLavaud pipe is free from casting strains and is so satisfactory to cut and tap.

And, when it comes to strength, exhaustive tests by authoritative laboratories have proved that deLavaud pipe will stand 25% more pressure than any other cast iron pipe of equal thickness.

deLavaud pipe is manufactured in accordance with U. S. government specifications. We are also making and furnishing this product in the various thicknesses and weights shown in the specifications of the American Water Works Association and the American Gas Association. Write for complete information.

United States Pipe and Foundry Co., Burlington, N.J.

Our pipe bears the "Q-Check" trademark of The Cast Iron Pipe Research Association

Sales Offices: New York, Philadelphia, Pittsburgh, Cleveland, Buffalo, Chicago, Dallas, Birmingham, Kansas City, Minneapolis, Seattle, San Francisco, Los Angeles

The law of averages stops the disc everywhere an equal number of times — —

360° of Wearing Surface

NO one knows how the roulette wheel will stop next—(or at least they shouldn't know). But one thing is sure—over a long period of trials it will stop an equal number of times in every position.

And the law of averages distributes the stops on the Darling revolving gate discs in the same way. Every time the gate is closed the disc is in a different position—which affords a 360° wearing surface—hence —a greatly extended valve life.

But what really creates this true disc and seat contact is the perfectly plain interior construction, free from ribs and irregular shapes with no pockets for collecting scale and dirt that can cause the parts to stick and jam in operation.

The Darling Forged Steel Valves afford producers a safe valve where pressure is extremely high or unknown. The Darval Semi-steel valve provides long service for all general uses, both low and high pressures.

DARLING VALVE & MFG. CO.

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GATE VALVES

Darling Outside Screw and Yoke Forged Steel Flanged End Gate Valve, Dar-o-loy trimmed.

Write today for our new complete Catalog No. 10

MONTH after month of service . . . . mile after mile of trench . . . . digging in every variety of soil . . . . thus for the past nine years has the Cleveland Baby Digger been steadily building for itself an unsurpassed record of proved performance.

A specialized type of trencher adapted to the gas industry by practical men who understand thoroughly the requirements. It is only logical that each year finds the popularity of the Baby Digger mounting rapidly.

Fundamentally correct in design the Baby Digger is backed by a construction of unparalleled quality. No other equipment item will surpass this machine in paying dividends.

Your company needs the Baby Digger.

THE BABY DIGGER

THE CLEVELAND TRENCHER COMPANY

"Pioneers of the Small Trencher"

20100 St. Clair Avenue
Cleveland, Ohio

"For every joint on every line"

Why tolerate pipe line leaks and money losses —when Victaulic Couplings insure 100% leak-proof lines—at low cost

?

Mail the Coupon for Victaulic Bulletin

For all sizes of steel, wrought iron, cast iron and spiral weld pipe—any pressure. Mail the coupon for detailed information.

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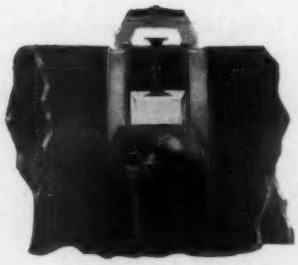
26 Broadway New York



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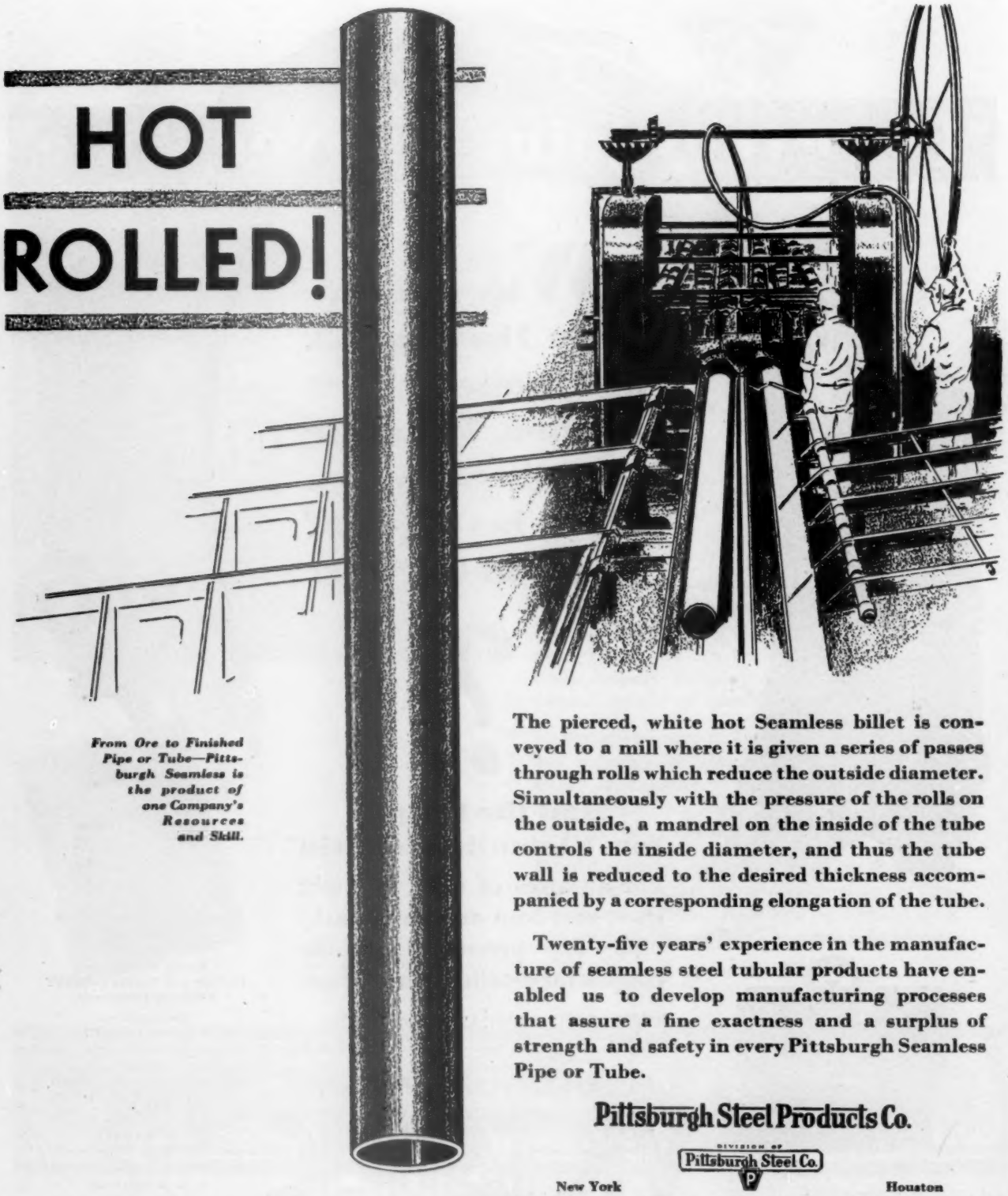

From Ore to Finished Pipe or Tube—Pittsburgh Seamless is the product of one Company's Resources and Skill.

The pierced, white hot Seamless billet is conveyed to a mill where it is given a series of passes through rolls which reduce the outside diameter. Simultaneously with the pressure of the rolls on the outside, a mandrel on the inside of the tube controls the inside diameter, and thus the tube wall is reduced to the desired thickness accompanied by a corresponding elongation of the tube.

Twenty-five years' experience in the manufacture of seamless steel tubular products have enabled us to develop manufacturing processes that assure a fine exactness and a surplus of strength and safety in every Pittsburgh Seamless Pipe or Tube.

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DIVISION OF Pittsburgh Steel Co.

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Pittsburgh Chicago Detroit St. Louis Houston Tulsa

Pittsburgh Seamless

CASING
OIL WELL TUBING
DRILL PIPE
LINE PIPE

Lengths up to 45 feet, depending on size and wall thickness. Sizes ½" to 14" O. D.

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Dresser Lines
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Absolutely & Permanently
DRESSER COUPLINGS
Dominate!
S.R. Dresser Mfg. Company
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DESIGNERS AND BUILDERS OF

Complete Coal Gas Plants

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GAS HOLDERS

THE BARTLETT HAYWARD COMPANY'S MAIN PLANT

AMERICAN
GAS JOURNAL
Established 1859 Pioneer of the Gas Industry
Including GAS INDUSTRY Est. 1900.

HENRY M. RILEY, *Editor*

Gas and Municipal Housing

THE GAS INDUSTRY will find it increasingly necessary to keep posted on those municipal problems which have to do with the growth and development of cities along purely civic lines. Thus, any future changes in the nature of street paving, availability of sites for future gas storage in outlying districts, and other contingencies must be foreseen well in advance. This obviously necessitates an intimate knowledge of what the city government is thinking about as regards future developments.

Of late many of the larger cities have been devoting more than passing attention to the matter of housing, particularly as it applies to the abolishment of the slum sections. In this connection it is interesting to note that England and Continental Europe have made great strides in wiping out such city blots. And, in place of the slums, they have erected living quarters that are attractive architecturally and conducive to the good health and well being of their occupants. In the latter regard, these housing projects make use of the latest sanitary and other similar equipment.

Some day, in the not distant future, American cities will actively emulate the good housing work done in Europe and when such a time arrives the Gas Industry should make an active bid for the installation of modern gas fired water heaters, ranges, laundry equipment, incinerators, refrigerators, and house heating furnaces. These and only these appliances will lay the smoke nuisance and promote the greatest health.

There are many who will aver that these appliances would be too costly to install and operate, particularly for the average workmen who would constitute the occupants. But, if we will bear in mind that house insulation is coming rapidly to the fore, that it costs somebody real money to have ashes and garbage carted away, that someone must pay the bill for increased hospital facilities and medicine on account of ailments due to breathing smoke, and that, after all, we are a quite wealthy nation and somehow manage to accomplish the "impossible" in a habitual sort of way, the suggested gas fired equipment would seem to be in order.

It would appear that the housing matter is one to keep in mind, so that, if a certain city government should come to a gas company with the plans and details of a large project of this nature and ask what could be done to supply gas for most of the occupants' needs, there would not be any undue "wool-gathering" and unnecessary show of unfamiliarity with the subject.

Gas Dispatching—a New Function in Distribution

HAVING gas at the right point at the right time in a big distribution system is essential to good service. This requires advance programming, both of production and of transmission. It requires more than this; it demands that there be some responsible office constantly watching production, holder supplies, gas demand, and distribution pressures, alert to unexpected problems and competent to care for them when they arise. Elsewhere in this issue the Detroit scheme for handling gas dispatching and the meeting of distribution emergencies is described.

More than ever the gas industry is approaching an inter-connected regional status. Natural gas is doing much to tie together various communities and various distribution systems. Long-distance high-pressure transmission of coke-oven gas is another factor working to this end. By skillful management, interconnected systems afford great economy in the gas business, just as in electrical-power supply. We need more such systems; but they bring with them new problems. Some important ones of this group are discussed in the article referred to, by Mr. Wiest. This article will bear careful study, not only by those who have dispatching problems today, but also by those who have prospects of interconnection and the attendant complications.

Public-Utility Gas Should Be Extended

THE BEST available data regarding gaseous fuel supply in the United States indicate that only 33 per cent of the volume and 27 per cent of the B.t.u. now marketed or used as gaseous fuel is handled by the public-utility gas systems of the country. This is rather a shockingly low percentage for the combined services of the natural-gas and the manufactured-gas divisions of the industry.

One of the immediate problems in expanding to higher percentages the utility phases of the gas business is to take full advantage of the supplies of propane, butane, and still gases now inadequately utilized in this country. Mr. A. M. Beebee discussed this subject very effectively before the recent meeting of the New England Gas Association. In this issue we publish rather a comprehensive resume of Mr. Beebee's paper and we urge that both engineers and executives of the industry study its discussion with great care.

There seems to be no doubt that there are at least twice as many heat units in propane, butane, and petroleum refinery still gases now available and adaptable to utility-company service as are handled through all of the manufactured-gas utility systems of the United States. The total is almost equal to the entire amount of heat served by the natural-gas public-utility companies of the country. If these trillions of heat units are not largely taken over for public service by the utility companies it will be a great misfortune. It will be a serious mistake from all points of view to have the development of those gaseous fuel supplies take place solely through direct industrial use. There are a few cases in which such direct industrial use doubtless can be justified on pure economic grounds. But in most instances both the industries served and the general public will be better off if the bulk of the transmission systems be part of the public-utility enterprises of the country. Mr. Beebee points the way to this desirable end.

Wanted: Cooks

WE RECENTLY READ of an electric appliance salesman who literally makes a "killing" because he is on such intimate terms with the appliances he puts in the homes that he can cook on any and all of them just about as good as the best woman cook one might care to mention.

It is perhaps a fact that a man is either a good hand at cooking or else so helpless in the kitchen that he scarcely knows how to operate a can opener that really works; there seems to be no middle ground in the matter. Considering those in the former category, we know of any number of males who can "sail into" a combination of flour, butter, yeast powder, salt, and milk, and turn out a mess of waffles that would do credit to the best waffle shop extant. And so on, for beefsteaks broiled to a tantalizing nicety and other nomely culinary accomplishments. Or if further substantiation is requested, we can call to mind a chemist of high standing in his profession who claimed never to miss it when at odd times he turned his deft fingers, so to speak, from the test tube to the pie pan. Incidentally, he by no means considered pie making as his masterpiece on the gas range but ceded the palm to his Baked Alaskas.

All of which, we believe, is nourishing proof that the aforementioned electric appliance salesman's ability cannot be more than fifty percent out of the ordinary.

We are sufficiently chesty to believe that in our own ranks of gas appliance salesmen there are a goodly number who can turn a trick or two in the kitchen, even if most of them wouldn't admit it. And, while we are not recommending that the appliance salesmen start

forthwith on a campaign with flour and lard ammunition, any ability in this connection might be a good card to hold up the sleeve in an emergency.

Progressivism to the Fore

THE DEVELOPMENT and acceptance of accessories for the many gas appliances offered for sale have been remarkable during the past few years. And the end is not yet in sight.

We can vividly recall the hue and cry that arose some twenty years ago when it was suggested that gas companies offer for sale a small portable baking oven for use over the top range burner. Came apace a dire and horrific quaking anent the loss of gas and a somewhat sulphurous admonition that the top burner was not supposed to be used for baking and roasting. But, we have outgrown these pains of development, even if the house furnishing stores did profit by them in the old days.

Are you like the old woman "who had so many children she dodn't know what to do"?

In turn, most of us oldsters can remember the creepy aversion to safety cocks, lighters, safety pilots, conversion jobs, and the like. Now, most of these find a wide and general acceptance, but more are needed.

In a recent article in *Delineator* some suggestions were made as to what is needed on the present gas range and from these we salvage the one having to do with the broiling oven. Therein it was suggested that for broiling small quantities of food too much gas is consumed and it was pointed out that it might be possible to segregate or somehow partition off one burner and only use the other. Thus, the consumption would be cut in half when broiling only a relatively small volume of food.

Here, it would seem, our old friend, the top burner, might again do a good turn as a pinch hitter. Perhaps a small portable broiling device that would not ruthlessly precipitate the juices and grease into the burner ports could be developed for use over the top burner. Such a crude device was in vogue some years back for use with an oil range. If we throw up our hands at the suggestion, we can be reassured in that we have a portable baker for the top burner, which now finds a ready sale. And, such accessories are a means to the end of bolstering the cooking load.

We should foster any proven devices that will increase the flexibility of gas utilization.

Setting a New Social Standard

THE National Business Survey Conference organized for the stabilization of employment and promotion of prosperity has recently issued one of its news bulletins containing a highly significant paragraph on renewed business prosperity.

"This improvement became possible because of the collective common sense, the courage and enterprise of all kinds of Americans, in business and out. We do, however, need to continue to apply these qualities, especially for the next few weeks. Careful planning and cooperation can improve buying power still further and can help to relieve individual hardship. Three months is a short period in the evolution of business, but a long time to the worker out of a job, even if he has accumulated savings."

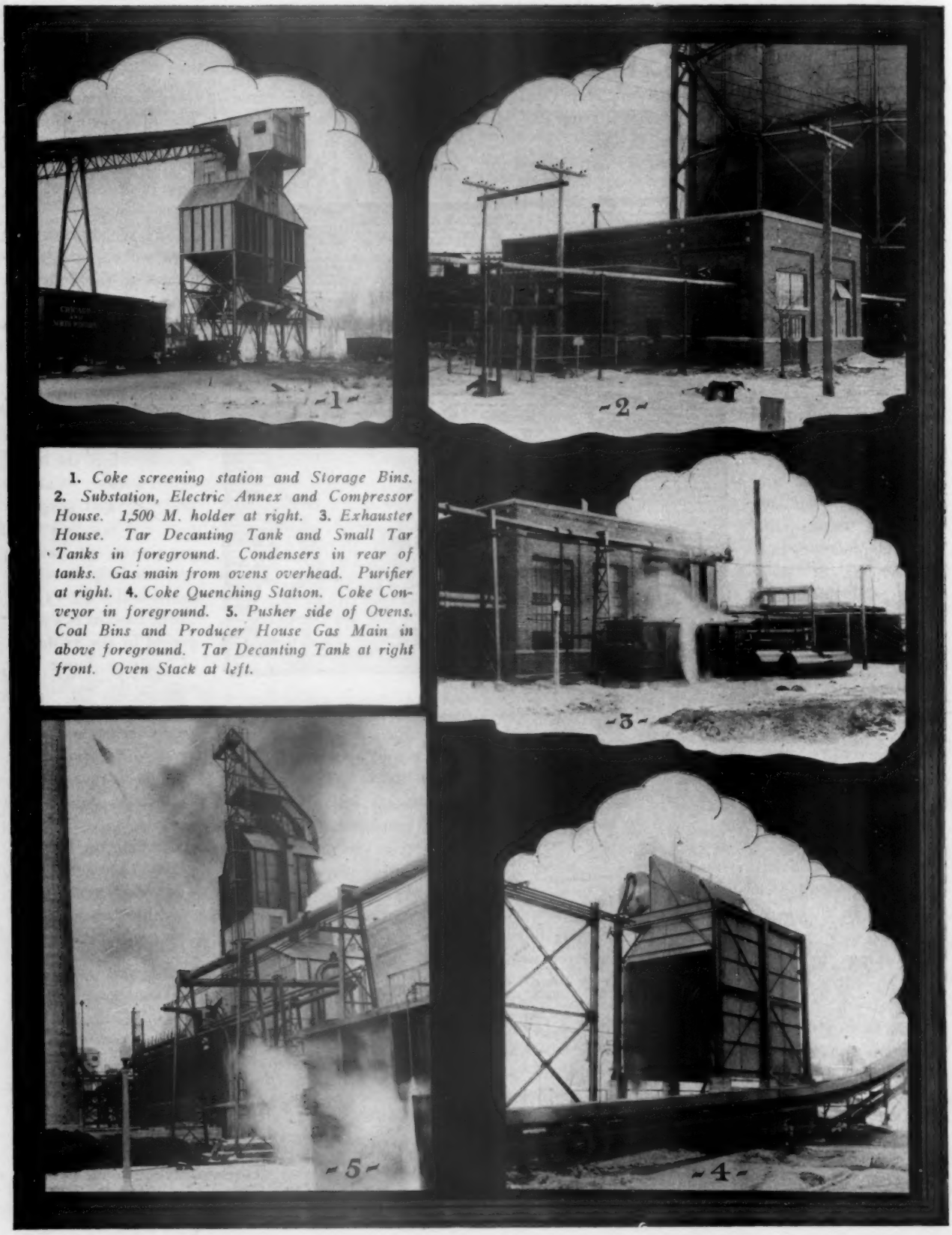
A wholly new social philosophy is to be seen in the last sentence. There is in it a clear evidence of fine cooperation and a recognition of common interest between employing company and employee.

There is no less definite a common interest between public-utility owner and public-utility customer. We only wish that this truth might be as clearly recognized. We hope that it will not take another stock-market crash or a threat of hard times to establish an appreciation of it.

Off to a Good Start

THE First Natural Regional Gas Sales Conference, a synopsis of which appears elsewhere in this issue, was a model from which many gas associations can mould their meetings. It embodied those essentials which make for any successful gathering of this nature —an enthusiastic and representative attendance, live papers, and efficient handling. A. G. A. did a first rate job in originating these conferences.

New Sheboygan Plant Cuts Corners With Modern Equipment



1. *Coke screening station and Storage Bins.* **2.** *Substation, Electric Annex and Compressor House. 1,500 M. holder at right.* **3.** *Exhauster House. Tar Decanting Tank and Small Tar Tanks in foreground. Condensers in rear of tanks. Gas main from ovens overhead. Purifier at right.* **4.** *Coke Quenching Station. Coke Conveyor in foreground.* **5.** *Pusher side of Ovens. Coal Bins and Producer House Gas Main in above foreground. Tar Decanting Tank at right front. Oven Stack at left.*

The New Coke Oven Plant At Sheboygan Wisconsin

G. G. ELLERBROCK
Wisconsin Public Service Corporation

RAPID expansion in both the domestic and industrial consumption of gas in Sheboygan and adjacent territory, made necessary an increase in our plant capacity to adequately care for such a demand. Anticipating the future demand on the basis of the present growth, a coke oven plant with a maximum daily capacity of 1,500,000 cubic feet of gas was finally selected, but only after a careful study had been made of all those factors peculiar to our own problem.

The economic features that most influenced our decision to build a coke oven plant were;

1—Good yield of gas with a high thermal value.
2—The potential market for coke very favorable.
3—Good yearly load factor.
4—Degradation of coke very small.
5—The ability to meet varying load conditions through the use of producer gas.

We will take each factor named above and analyze it somewhat.

The first factor, good yield of gas with a high thermal value, speaks for itself, as every student of the different processes of gas manufacture knows the modern coke oven is a machine of high efficiency, producing a good gas yield of high heating value.

Factor two, potential market for coke very favorable, is one of prime importance and a study applied to coal gas plants, will show very clearly how important the coke credit is in the final cost of the gas. Coal gas can be made very cheaply if the differential between the cost of coal and the selling price of coke is sufficient. In our own locality we have built up a good coke business and the prospects for the future sale of coke are very good.

Influence of Seasonal Demands

Factor three, good yearly load factor, ranks with an assured coke market, as one of major importance. An improved load factor offers the greatest opportunity for a reduction in the production cost of gas. We have in Sheboygan one of those situations rarely found in the gas industry, a summer load that exceeds the winter demand. This increased summer consumption is due to two things, a large water heating load and an increased domestic cooking load. The increase in the waterheating and cooking demand is partly due to the gas consumed by several summer vacation colonies, which are in close proximity to Sheboygan. Thus that factor most feared of by gas men, namely, the winter house heating load, works to our advantage in smoothing out the yearly load curve. The periods of demand for summer water heating and cooking and winter house heating fortunately do not overlap. The former includes the period from the month of April to the month of October, while the latter includes the period from September to May. It was probably this factor more than any other, that influenced our decision in favor of a coke oven plant.

Factor four, degradation of coke very small, does not appear to be worthy of mention at first glance, but the amount of degradation or breakage of the coke has a direct bearing on the coke credit and thus an indirect bearing on the production cost of the gas. The coke produced from the modern coke oven has a hard, dense structure and thus breakage is held to a minimum.

Factor five, the production of a flexible amount of surplus gas to meet varying load conditions is explained as follows: Since the ovens are heated with producer gas, the entire production of coal gas is available for distribution, although when conditions warrant it, any percentage of the under-firing gas may readily be replaced by coke oven gas.

Modern Equipment Installed

The plant is equipped with the latest and most efficient machinery and facilities to give the most economical and satisfactory service in the production of a high quality gas.

A step by step description of the plant layout and equipment may be in order at this point. The coal handling system consists of the following pieces of equipment. A track hopper approximately twelve feet square lined with vitrified brick, receives coal directly from cars and feeds a 24 inch motor driven apron conveyor, which in turn discharges the coal into a motor-driven hammermill designed to pulverize 50 tons of coal per hour. The coal is pulverized to such a fineness that 85 percent will pass through a screen having ⅛" openings. After leaving the hammermill, the pulverized coal is received into a concrete balancing hopper which is lined with vitrified brick. This balancing hopper feeds an automatic loader, which delivers the coal to a skip hoist bucket. The skip bucket elevates the coal from the balancing hopper to a receiving hopper. Two storage bins, one of 175 and one of 75 ton capacity receive the coal from the receiving hopper by means of chutes. These chutes are provided with gates so that the coal can be delivered either to the 75 ton or 175 ton bin. This arrangement allows for the mixing of high and low volatile coals by means of mixing belts

placed under the two bins. The ovens are charged from the top by means of a motor driven coal charging larry car which conveys the coal from the coal storage bins to the coke ovens.

Gas Production Equipment

The gas production equipment consists of 15 Becker type coke ovens, 9 feet 6 inches high, 20 feet 7 inches long and 13½ inches average width with a ¾ inch taper. It is interesting to note that these coke ovens are among the smallest of their type ever built, having a capacity of approximately 4.08 tons of coal each. The ovens are equipped to burn either oven gas or producer gas. The oven doors are self sealing, thus eliminating the use of a patching material to make them airtight. Regulation of pressures on the oven gas collecting main, oven fuel gas main and in the waste gas flue are performed mechanically by means of automatic regulators. The stack or chimney for supplying the necessary draft and for carrying off the combustion products from the ovens, is of radial brick construction, 4 feet in diameter at the top and 200 feet high. A perforated radial brick lining 4 inches thick extends 50 feet in height from the base of the stack.

The producer for supplying the necessary fuel gas to the ovens, is of the Kerpely center-feed type, 8 feet 6 inches in diameter. This producer is equipped with a revolving cast iron grate. This rotating grate, as well as the ash pan, are motor driven through the necessary speed reducers, line shafting, gear mechanism, etc. This rotating ash pan makes the producer self-cleaning, eliminating arduous manual cleaning. The same motor that drives the grate mechanism, also actuates the revolving feed hopper with distributing feeder. This revolving feeder distributes the coal evenly over the producer fuel bed, eliminating the piling up of fuel in the center of the producer, which is a familiar fault of center feed producers. There is a water jacket surrounding the producer shell which generates steam at 15 pounds pressure for use under the producer.

Fuel for the producer, generally pea size coke (over a ½ inch screen) is supplied to the producer from an overhead bin of 18 tons capacity. Air is supplied to the producer by two turbo-type air blowers, one motor driven and the other driven by a steam turbine. This arrangement insures continuity of supply during emergency periods. These blowers have a capacity of 115,000 cubic feet of free air per hour, against a discharge pressure of 24 inches water column and 4 inches suction. The air supply to the producer is shut off during the reversal period of the coke oven battery, to avoid the building up of high pressures in the producer fuel gas line supplying the battery. This is accomplished by means of a damper in the air blast line actuated by a mechanical regulator.

At the termination of the coking period, the coke is pushed from the ovens by means of a pusher machine. This machine is a combination coke pusher, coal leveler and door lifting machine; arranged to carry a motor driven ram to push the coke from the ovens, a motor driven leveler bar to level the coal in the oven after charging and a manually operated door ram to remove and replace the oven doors. A steam or air-driven Dake engine is provided for withdrawing the ram or leveler bar in case of emergency.

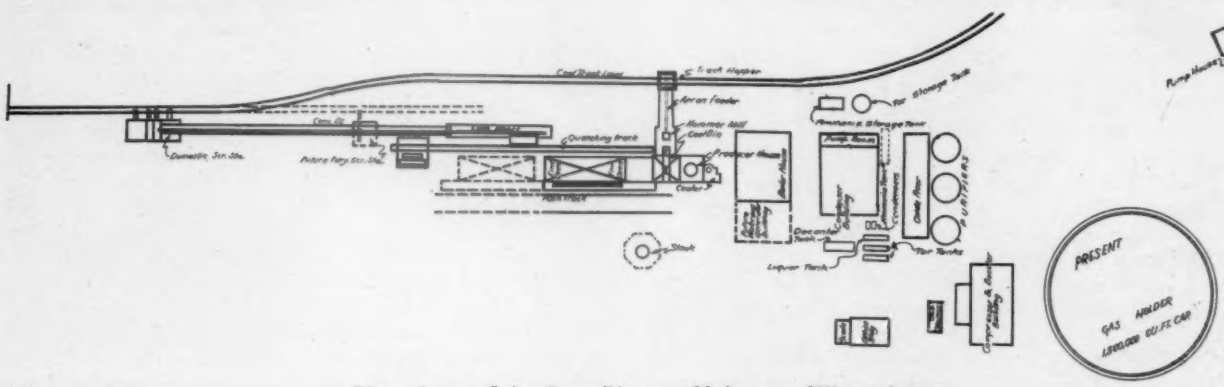
Coke Quenching Procedure

The coke is pushed into a combination hot coke car, which also has a door ram for the handling of the oven doors on the coke side of the ovens. This car conveys the hot coke to the quenching station. The tank containing the quenching water is of 4000 gallon capacity and, of course, is elevated on a structural steel framework. The water for quenching is taken directly from the main plant water supply line and after the coke is quenched is allowed to run to the sewer.

The coke after quenching, is elevated by an inclined belt conveyor to the top of the domestic screening station. This conveyor is 24 inches wide and is capable of handling 25 tons of coke per hour.

At the domestic screening station the coke is either fed to a scalping grizzly and crusher or by-passed around this equipment. The coke is then delivered from the grizzly and crusher to a single deck shaking screen. The oversize coke (egg coke) is delivered by chute to the egg storage bin of 70 tons capacity, while the undersized is delivered to a double deck shaking screen. The oversize of the upper deck (nut coke) is delivered to the nut storage bin (60 tons capacity) and the oversize of the lower deck (pea coke) is delivered to the pea storage bin (35 tons capacity). The undersize of the lower deck is delivered to the breeze storage bin of 35 tons capacity. Coke can be delivered from any of the storage bins by means of chutes into open railroad cars. The coke from the egg and nut bins is run over a bar rescreen before being loaded into railroad cars or automobile trucks. This insures clean coke, free from breeze and dirt. Provision has been made for the future installation of screening equipment for the production of foundry coke. The bottoms of the coke storage bins are lined with mill paver brick laid flat.

To supply the necessary steam requirements for the plant, two 245-H.P. boilers have been installed. These boilers are of the Wetherbee bent-tube type and are hand fired; but provision has been made for the installation of automatic stokers. The boiler appurte-



Plan of new Coke Oven Plant at Sheboygan, Wisconsin

nances such as soot blowers, safety valves, blow-off valves, gauges, and water columns are all of approved and modern design. These boilers are connected to separate steel stacks 132 feet high above the grate line, and 4 feet in diameter. The boiler feed water is treated with alum before entering the filter, which acts as a coagulant, catching the fine particles and dissolved color. The sand filter can then strain out this floc with the entrained particles and color. The vertical feed water heater is of the open type and is capable of heating 17,000 pounds of water per hour from 40° to 210° F. The boiler feed water pumps are of the piston type and duplicate units have been provided for emergencies. It is our intention to burn coke breeze as fuel in these boilers.

Handling Coke Oven Gas

The coke oven gas coming from the battery is cooled by two primary coolers of the tubular type, each cooler having a capacity sufficient for cooling the gas at the rate of 1,500,000 cubic feet per 24 hours from 180° to 80° F, when provided with 220 gallons of cooling water per minute at a maximum temperature of 65° F. The gas then passes into exhausters of the Roots type driven by vertical steam engines. These exhausters are held to a constant speed by means of fly-ball governors and, to prevent excessive suction on the coke oven battery, a by-pass has been provided which allows gas to flow back from the discharge side to the suction side of the exhauster until normal suction pressure has been restored. The by-passing of this gas is regulated by a damper in the by-pass line which is actuated by a mechanical regulator. The suction pressure on the inlet line to the exhauster is the controlling pressure on the regulator thus any fluctuations in header suction pressure immediately operates the regulator which controls the damper in the by-pass around the exhauster.

From the exhausters the gas enters the tar extractor, which is of the P & A type, capable of handling 100,000 cubic feet of gas per hour. Tar-free gas now passes into the intensive ammonia scrubbers. These scrubbers are of the regular washer-cooler type. For supplying the necessary liquor to the sprays two twin motor driven centrifugal pumps are provided; these pumps are of sufficient capacity to pump the liquor at the rate of 20 gallons per minute against a 40 foot head. The hydrogen sulphide in the gas is removed by three oxide boxes, 24 feet in diameter by 13 feet high. The volume of gas made is measured by a rotary displacement meter which is designed to handle 150,000 cubic feet of gas per hour. The gas is then stored in a 1,500,000 cubic foot holder of the water seal type.

The by-product apparatus consists of the ammonia scrubbers (described elsewhere in this paper), an ammonia still, tar dehydrated tank, tar and ammonia storage tanks and the necessary tar, ammonia and circulating liquor pumps. One of the circulating liquor pumps is a motor driven centrifugal pump and the other is a steam driven piston pump, this arrangement insuring continuity of supply to the sprays on the gas collecting main of the coke ovens. This duplication of necessary equipment has been carried out in the plant design wherever possible.

The water necessary for plant operation is taken from the Sheboygan River and is handled by two centrifugal pumps, one steam driven and the other motor driven. These pumps each handle 600 gallons of water per minute at a discharge pressure of 65 pounds per square inch. An emergency water supply is supplied from a well dug on the property.

For keeping the necessary gas pressures on the distribution system, both high and low pressure, the installation of boosters and compressors was necessary. The boosters are of the rotary displacement type, one being motor driven and the other steam driven, each having a capacity of 350,000 cubic feet per hour at 5 pounds pressure. The three compressors are of the Ingersoll Rand type, one being steam driven and the other two having motor drive. The steam driven unit and one of the motor driven units each have a minimum capacity of 40,000 cubic feet per hour at 45 pounds pressure. The other motor driven unit has a minimum capacity of 66,300 cubic feet per hour at 100 pounds pressure. It is interesting to note that these compressors rest on cork insulation, thus eliminating vibration to a large extent.

It may be of interest to the readers of this article to know that piling had to be driven to provide a firm foundation for all the buildings and equipment including the coke oven battery. The pit accommodating the skip hoist equipment had to be sunk as a caisson, due to the presence of numerous springs and quick sand encountered during excavation. The Byllesby Engineering & Management Corporation were the engineers in charge of the design and construction of the new plant.

In conclusion, ample provision has been made for an ultimate plant capacity of 12,000,000 cubic feet per day both in ground space and in the placing of equipment.

Eliminating Noise in Gas Making Machinery

SOMETIMES the vibration of gas making machinery causes much undesirable noise and distress, and the question is asked: "How can we stop this vibration?"

One concern of my acquaintance decided the best thing to do was to lay a heavy foundation under the machine—so heavy that the comparatively small machine would be unable to cause the heavy mass to vibrate with the machine. This machine was on a second floor. The heavy foundation installed was made of lead. The method "worked" but there are two objections to that method. First, it is an expensive method. Second, it is sometimes impossible to increase the load on a second floor without adding reinforcing columns underneath. It so happened that in this instance additional columns were not required.

The best method I know of for eliminating vibrations of this sort is the use of cork board. By using cork, vibrations may be eliminated "scientifically." Do not distribute the weight over a large area of cork, however, The area must be restricted so that the cork will be under the right amount of compression. Sometimes cork of different densities are used. Sometimes heavy concrete foundations are poured directly on top of cork board, and the sides of the foundation are lined with cork of proper thickness and density. The weight of the foundation plus the weight of the machine are calculated to give the cork the proper amount of compression. Vibration is thereby eliminated.

Cork board is ideal for this purpose because it is strong in compression, is highly elastic, is surprisingly durable, and does not rot. The fact that cork weighs so little per cubic foot is its great advantage for use on second floors.—*W. F. Schaphorst.*

When Should A Gas Well Be Abandoned?

J. HAWKER NEWLON

Geologist, Equitable Gas Company—Pittsburgh & West Virginia Gas Company

THE question "When should a gas well be abandoned?" is, on the face of it, a very simple one and most people would, without stopping to give serious thought to the problem, readily reply, "When it can no longer be operated at a profit." That answer, is no answer at all. It is "begging the question," because it then becomes necessary to determine when a well can no longer be operated at a profit, before the operating manager can decide whether any particular well should or should not be abandoned. Obviously, there are several considerations to be borne in mind in forming such judgments, and while the amount of gas that can be produced from the well is an important consideration, it alone is not all inclusive. The market price of the production is equally important, as is also the operating and other costs of producing it. Moreover, the probability of increasing the production and reserves by drilling deeper must be given careful study. Even then a conclusion based on the above factors only can not be taken as final, because the lease terms and other contracts that have been entered into may, or may not, contain important provisions that can not be disregarded or violated. Without having all the pertinent facts at hand any conclusion drawn is only a "blind guess," but when they are available and understood, the problem yields readily to solution by logical thinking and it should not prove to be extremely difficult to any operating manager who has had the experience that is generally conceded to be requisite for one in his position.

Arriving at a Satisfactory Conclusion

But how shall the operating manager get this information? And how much reliance can he place in it? Certainly he must appreciate the importance of such data and it is assumed that he has formed his organization so that it is readily available. The Geological, Land, Production, Sales, Accounting and Engineering Departments will each submit their facts and opinions and when they are all brought together, though they may not concur in one opinion, the final conclusion should not be difficult to form. With the exception of the Geological and Engineering Departments, they will all submit facts and figures that can not reasonably be questioned for they are a compilation of data on transactions that have already been completed, but the Geological and Engineering Departments are asked to forecast the future. Of course that can not be done with absolute accuracy but every day it is being demonstrated that an intelligent guess based on facts is much better for operating purposes than a "wild hunch." It is not the purpose of this article to question either the methods or results of the Geologist in forming his opinion as to whether or not any well should be abandoned or drilled deeper, but rather it is intended to point out the accuracy to which he can estimate depletion and future recoverable reserves.

J. H. Newlon (right) and Geo. E. Miller, Jr., testing gas well with new test gauge

Problem Is Not New

The problem of estimating the probable future reserves of a gas well is not new, and an accurate method has already been formulated and has been in general use for a number of years. It is based on "Boyle's Law of Perfect Gases," which states that "the volume of a gas in a container of fixed size varies directly with the absolute pressure to which it is subject." For the purpose of estimating gas reserves in a well it is assumed that the space occupied by the gas in the producing sand is fixed and that it does not vary by reason of water encroachment or other causes. Then, knowing the initial "Rock" pressure and knowing the amount of gas that has been taken from the well during any interval of time, the amount of gas that still remains in the sand can be computed if the "Rock" pressure of the well

is again taken after the amount of gas has been withdrawn. Stated in mathematical form:

$$P' : V' = P'' : V'' \text{ or}$$

(1) $V'' = V' P''/P'$

when P' = *Initial absolute pressure in pounds per Sq. In.*

V' = *Initial volume of gas in well in Cu. Ft.*

P'' = *Absolute pressure in pounds per Sq. In. after well has produced "Q" Cu. Ft. of gas.*

V'' = *Volume of gas in Cu. Ft. remaining in well after well has produced "Q" Cu. Ft. of gas.*

then if Q = *Volume of gas already produced* $= V' - V''$

(2) *or* $V' = V'' + Q$

Then substituting in (1) the value of V' as given in (2)

$$V'' = (Q + V'')P''/P'$$

and simplifying

$$V'' = QP''/(P' - P'')$$

All companies known to the author keep a record of the annual production from each well, and this production is cumulative from year to year. Also, the rock pressure of each well is generally taken once a year or oftener and from this cumulative data a graph of past production can be plotted against the corresponding rock pressures. This curve will be a straight line if the data is accurate and to obtain an estimate of future production it is only necessary to extend this line to amospheric pressure or one slightly above that is judged, in the light of past experience, to represent the economic limit to which the well can be operated. This can also be done analytically by use of the formula given above but the graphical method is the one most commonly used. It is very seldom, if ever, that an individual well will have a meter on it but it is generally turned into the field line and the gas from a number of wells is then measured through one meter. In order to determine the amount of gas that each individual well has produced it is necessary to allocate the total gas measured by the meter to each well. This allocation is made by using as a basis of allocation, the theoretical production of each well. The theoretical production is calculated in the following manner.

Calculating Theoretical Production

It is assumed that the casing record for each well is available and that the cubical content of the well can be computed. (By cubical content is meant the space inside the tubing, and casing below the packer, which is filled with gas or what is known as the "Open Hole.") When the well is feeding into the line, the amount of gas, measured at any measuring basis, that is contained in the "open hole" can be computed. When the line gate is closed, though the well is no longer feeding into the line, gas is being delivered from the producing sand into the "open hole." This compresses the gas already in the "producing string" or "open hole" and gives rise to an increase in pressure thereby. At the end of one minute the pressure is again read and the amount of gas then contained in that same space is again computed at the same measuring basis as before. The difference between these two volumes represents the amount of gas that the well will produce against the line pressure at which the test was made. Stated in mathematical form, the amount of gas delivered under the above conditions and as measured at atmospheric pressure is:

$$Q = 100\ V'\ (P' - P')$$

when Q = *Daily production in Cu. Ft.*

V' = *Volume of the open hole in the well in Cu. Ft. (Volume of tubing plus volume of hole below packer.)*

P'' = *Gauge pressure plus 14.4 in pounds per Sq. In. at end of the first minute.*

P' = *Line pressure plus 14.4 in pounds per Sq. In.*

It is apparent that the amount of gas delivered is a function of two variables, namely the volume of the open hole in the well and the increase in pressure during the first minute. The accuracy to which these computations can be made, is then dependent upon the accuracy to which the volume of the well is known and upon the accuracy to which the increase in pressure can be measured. Where these data are accurately known the theoretical production will check the metered production close enough for practical purposes and the results can be used without correction by allocation. This is practically never done for the data on all wells would have to be accurately known and this rarely, if ever, happens in practice. Corrections for specific gravity, temperature and etc., are neglected because the accuracy of the other data do not warrant such refinements.

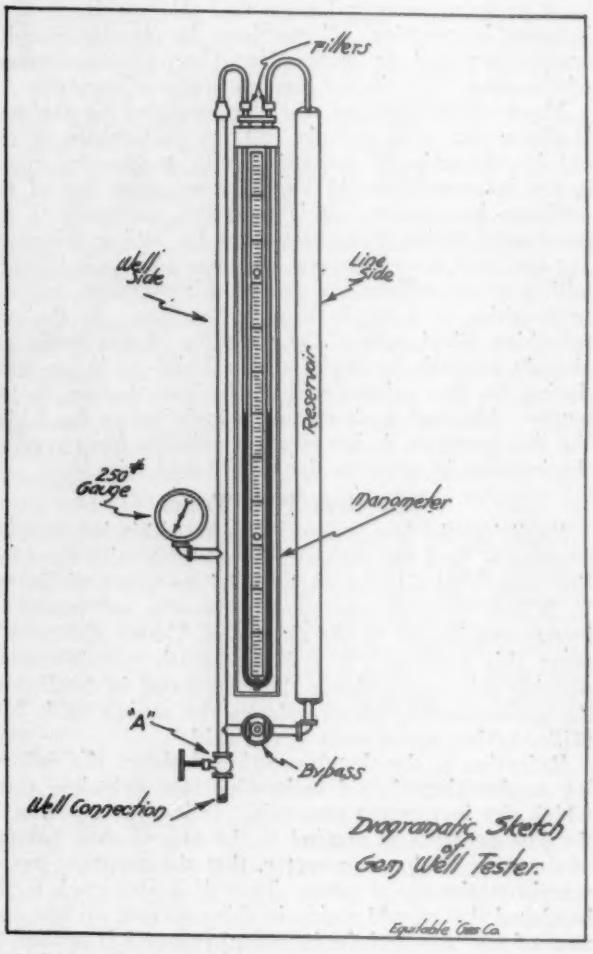
More often than not, the line pressure on the well is above ten (10) pounds and for that reason it can not be conveniently measured with a mercury manometer because it would blow the mercury out of the ordinary instrument. It is therefore necessary to depend upon spring pressure gauges for taking this reading and it is a well known fact that any spring gauge, with a range sufficient to record this pressure, will not be sensitive to a small pressure increase. In the Appalachian Field, where the majority of gas wells are already extensively depleted, the build-up in pressure during the first minute will not be indicated on such a gauge. Although such a gauge is satisfactory for taking the line pressure, it is not at all suitable for recording the increase in pressure during the first minute.

The Gem Well Tester

Realizing the importance of getting this information accurately, and the difficulty in working with the tools that were available, an engineer by the name of George E. Miller, Jr., was prompted to develop and patent an instrument known as the Gem Well Tester, that would serve this purpose. The diagrammatic sketch accompanying this report shows the instrument in detail, and the accompanying picture shows the author with Mr. Miller taking actual tests in the field.

Referring to the sketch mentioned above, the following explanation should make clear the principle upon which the instrument operates. It is apparent that if the line pressure is applied to the top of each column of mercury in the manometer, that the mercury would remain stationary at zero. Then if a stop cock could be closed that would maintain this pressure on one column of mercury and the increased pressure is applied to the other column, this increase in pressure would then cause the mercury on that side called the "well side' in the sketch to be driven down and on the other side called the "line side" to be driven up, and the difference in height of the two columns of mercury would indicate the increase in pressure. However, the gas that is

displaced by the mercury on the "line side" of the manometer would cause the gas so enclosed to be compressed above the initial line pressure. This error is not negligible and the percent of error would vary with the initial line pressure at which tests were made. No compensated scale could be laid out on the manometer to correct this error and a voluminous table of corrections would be necessary to make such an instrument useable. To avoid this, it would be possible to connect the "line side" of the manometer to the line itself and then the amount of gas displaced would not cause an increase in pressure but the true line pressure would actually be maintained. Obviously, this plan is not practicable because of the labor required in making connections. In order to avoid this difficulty and still eliminate the necessity of using correction tables, the instrument as shown in the sketch was designed with a reservoir on the "line side" of the manometer. While it is true that the mercury displacement even yet causes a slight increase in pressure on this side of the manometer, the ratio between the volume of the reservoir and the maximum volume of displacement is so fixed that the maximum error in readings will be less than twenty-five hundredths of one (.25%) per cent, which is less than other errors that enter the tests.



The accompanying picture will show that this instrument is connected to the well in the same manner as a spring gauge. The operation is as follows: with the by-pass valve open the instrument is connected to the well and the line pressure, as indicated by the spring gauge (which is attached and made a part of the instrument) is recorded. Then the by-pass valve is closed and the well "shut in." It is no longer possible for the increase in pressure to be applied on the "line side" of the instrument and the difference in pressure is indicated by the movement of the mercury as explained above. At the end of one minute, the valve marked "A" is closed, and after about ten seconds the increase in pressure is read directly in pounds and tenths of pounds, the instrument being calibrated in that unit. The delay in reading the height of the mercury is necessitated by reason of the fact that filters have been inserted at the top of each leg of the manometer to prevent the escape of mercury when the instrument is inverted in transportation, and about ten seconds are required for the pressure to equalize and the mercury to become stationary. By reopening valve "A" after the reading is taken and then closing it again at the end of the second minute, the rise during the second minute can also be taken in the same manner that the first minute readings were taken, and so on for as many minutes as desired until the limiting range of the instrument is reached. This limit is seven and one-half (7½lb.) pounds. In case the first minute rise in pressure is in excess of the amount, the by-pass valve should be opened and the increase in pressure read on the spring gauge. While it is true that the gauge readings will not be as accurate as the manometer reading it is also true that the percent of error in the computed production indicated by so large a rise in pressure will probably be no larger than error introduced by a very small inaccuracy in reading an increase of one pound or less. In many wells the build-up of pressure will be less than a pound and it is these small increments that the tester was primarily designed to measure. To disconnect from the well the by-pass valve is first opened and the instrument then removed as any spring gauge would be disconnected.

Instrument Reasonably Accurate

While this instrument is new, it has been in use by the author over a period of several months and approximately one hundred wells have been tested. In the past it has been necessary to install a meter at a well that would accurately measure its delivery in cubic feet per day into the line, when the actual production has been in question. In order to check the accuracy of the Gem Tester, wells were selected at which meters had already been installed and in every instance, where the capacity or cubical content of the "open hole" was known to be reasonably correct, the production as measured by the manometer was found to be in error of less than ten (10) percent of the metered production. It is worthy of note that the production as calculated above is dependent upon the capacity or cubical content of the open hole in the well and it is exceedingly important to have this volume correct. Where wells have caved and later been cleaned out, or where the hole may be partially filled with water, the volume will be different from that indicated by the casing record and cognizance of this fact should be taken in making estimates. It is also possible with this instrument to measure the actual volume of a well where these changes have occurred and no record kept of the material that was taken out when the well was cleaned.

Regardless of what quantities are being calculated it should always be borne in mind that the results of the computations can never be any more accurate than the measurements of the quantities that are used. As stated above, the amount of gas that a well is producing is

not the only factor to be determined in judging whether or not a well should be abandoned, still it is always very important and quite frequently it is the deciding factor. It has been the common experience of the author to receive recommendations for the abandonment of wells when a special well test, the accuracy of which (on account of poor instruments) was in doubt, has been used as the basis of such recommendations. In instances where the one minute build-up in pressure could not be measured, a meter has been installed on the well in question and its production thus accurately determined. While this is an expensive practice, it has been found to be well worth while in the saving of royalties on dead wells and in the saving of invested capital on wells that were actually profitable to operate and that otherwise would have been abandoned and plugged.

The author has attempted to show in the above why these data are important and why it is deemed to be worth while to spend considerable sums in keeping this kind of records. If they are worth keeping at all, it seems apparent that they are worth taking properly, and that the correct instruments should be placed in the hands of those who actually take the readings. In the past it could not be attributed to the inaccuracy or inability of the one making these tests that the information recorded was incongruous, for the most highly trained scientist could not take more accurate readings with the kind of equipment that was available. This new method of arriving at the actual deliveries of gas wells certainly must be considered as a real contribution to the gas industry in making it possible to obtain accurate information as to well conditions, which is all important in efficient operation.

The author desires to acknowledge the very kind and efficient cooperation of Mr. George E. Miller, Jr., Engineer, Gas Depletion Department, Columbia Gas Corporation, Pittsburgh, Pa.

Liquefied Gases-An Asset or Liability to the Gas Industry

A. M. BEEBEE

General Supt., Rochester Gas & Electric Corporation

IN business as well as social life how many times our enemies are in reality our best friends when that term is used to describe those influences which do us the greatest good. Further, ability to adapt oneself to changing conditions has been given as one of the cardinal fundamentals of successful development.

We were recently most annoyed at threatened litigation regarding stream pollution which did not seem to be doing anyone any harm, yet when pressure was brought to bear we immediately busied ourselves and developed means for taking care of the situation in a manner which nets a very satisfactory rate of return. The sulphur and cyanogen compounds which were the offending materials, by rather simple methods, have been developed to make ammonium thiocyanate which has shown commercial development in the manufacture of the popular thiourea formaldehyde resins. Again we were almost pushed against our will into the installation of our coke dry quenching process in order to eliminate the quenching vapors and when we did so, we found that it had many intangible benefits as well as netting a handsome rate of return.

Necessity being the mother of invention, it often seems that rarely do we progress except as we are pushed ahead by the competition of opposing forces. We in the Gas Industry have heard much of late about the seriousness of the competition of various petroleum products, and have grown to look upon the oil industry as an enemy. The oil industry and the gas industry have a common goal, namely the serving of the fuel needs of a nation. Each has its particular field, though to a greater and greater extent they are becoming more and more interrelated, and through a system of cooperation each can be a complement and an asset to the other, providing each is willing to adjust itself to, and serve as possible outlets for some of the by-products of the other.

We have heard much of the fear of the developments which are taking place in the petroleum industry. Rather than fearing the inevitable and awaiting future moves and development on their part, ought we not busy ourselves to investigate the problems of the oil industry and learn, if we can, what is bothering them. Perhaps we can be of help to them, possibly to mutual advantage. We can intelligently understand the situation only by studying the economics with which they are confronted and we may find that cooperation can be adopted to mutual benefit.

Both the oil industry and the gas industry are selling B.T.U's even if they do tend to be in different forms. With reference to the particular problem in question, it would seem that a highly concentrated B. T. U. in an ashless form should be welcomed rather than feared by the gas industry. Economics of course play the governing position but a joint approach to the problem ought to provide a mutual benefit far greater than that which would result to either when attacked separately.

An attempt to undertake an analysis along this line de-

Part of paper read before Annual Meeting, New England Gas Assn. February 19-20, 1930.

veloped the thought that a sub-committee of the Engineering & Economic Survey Committee of the American Gas Association could well afford to be formed to study this problem. This has been done and a committee under the able chairmanship of J. A. Perry has been appointed to function in this capacity and is already at work on the problem. By the time the A. G. A. Convention arrives, it should have considerable and interesting data to offer. The balance of this paper will concern itself with the results of this preliminary study prior to the appointment of this definite committee. While the data given here is rather intangible and the later findings of the committee should carry far greater weight, nevertheless the following may serve to give a preliminary and hasty picture of the situation.

The Horizon Clouded

The competition from propane, butane and other liquefied gases, as well as from refinery by-products has clouded the horizon of the gas industry, particularly during the past year or two. Statistics show that the amount of natural gas being sold is greatly increasing in the past two years, particularly the past year, which shows an increase of some 20% over 1928, with a total of some 1.9 trillion cu. ft. or nearly four times the quantity of manufactured gas sold on a volume basis or nearly eight times on a thermal basis. These same statistics show that 94% of the gas sold is being treated to extract the wet natural gasoline which includes the propane and butane of which we have heard so much.

Thus we can begin to realize that we are confronted with tremendous quantities. Statistics are offered in the January, 1930, Chemical & Metallurgical Engineering showing that the quantities of propane and butane recovered and recoverable represent in energy between 10 and 20% of the present manufactured gas sent out, with from four to ten times this amount ultimately available. Since the production of these fuels is a function of natural gas production and since there is, at present at least, little indication of an exhaustion or a decrease in the production of natural gas, but rather to the contrary, it therefore appears axiomatic that we can look to an increase rather than a decrease in the quantities of these fuels available in the future.

It has been possible by pyrogenic cracking of the heavier compounds by either the liquid phase or vapor phase type of plant to split off carbon atoms so that the net result is an increase in the hydrogen content of the resultant products, thereby producing a lighter fuel from a heavier one. It is true this method accomplishes its purpose by destructive methods, yet it is commercially economic to do so, due to proportionally higher value of the lighter fuels. Recently the same net result has been accomplished by the development of hydrogenation by which process the additional hydrogen necessary to make a lighter fuel is synthetically added which of course results in a larger production of fuels from a given quantity of heavy oil than is produced by the cracking processes.

Influence of Motor Fuel Demands

In the process of making lighter compounds from heavy ones by either of the above methods, large quantities of gaseous and semi-gas-liquid fuels such as propane and butane are produced. Futhermore when any of these processes of making lighter fuels from heavier ones are operated in a manner so as to produce fuels with superior anti-knock properties, the percentage production of gas and these semi-gas liquid fuels increases. In view of the trend of motor fuel demands, it is therefore impressive that these compounds will continue to increase as time goes on. Therefore, we can begin to see that every refinery becomes a potential source of not only high B. T. U. gas but also of the gas liquid compounds with which we are concerned.

We in the East are not protected by freight rates and the problem becomes one that is national in scope. We have been informed that one refinery in the Metropolitan area will have available within a year from 50,000 to 150,000 gals. of propane a day. In fact, from oil refineries a high B. T. U. gas is available as an excess by-product in addition to fuels of the propane type. In case the hydrogenation plants for the conversion of heavier fuels into lighter ones come into vogue, they in themselves will tend to provide an outlet for the excess gas, since such gas is an ideal source of hydrogen for the hydrogenation process. However, the ability of the hydrogenation plants to absorb the excess gas from the refinery it would seem is still quite a distance in the future.

Furthermore, the oil industry utilized itself, in a very inefficient manner, large quantities of this gas in its own operation, for which use it would seem it ought to use a B.T.U. of lower value. Therefore, it would seem that both the refinery and the gas industry were missing a bet in not making better use of this concentrated B.T.U. in an ashless fuel. In this connection I want to quote from an article by R. S. McBride in the January issue of Chemical & Metallurgical Engineering.

Opinion of R. S. McBride

> "Petroleum refineries are another potential source of city-gas supply that is as yet practically untouched, in fact almost unrecognized. These refineries produce and utilize merely for heating operations in their own plants the equivalent of 80 trillion B.t.u. per year of gas which can more or less readily be adapted to city supply. Thus here is another source equal to fully 40 per cent of the present heat production of the public-utility manufactured-gas works of the country. This gaseous fuel is, to be sure, at present used by petroleum refineries, where it is probably supplanting other hydro-carbon fuels at a rate that makes it worth to the refiner about 15 cents per million B.t.u."

All the above then brings us to the conclusion that the refinery has excess fuels in the form of gas and propane and the wet natural gas fields have propane, which, as far as we can now see only find outlet supplying fields which hitherto we have considered as belonging to us, unless we in turn can arrange our methods so as to take it from them.

Here again let me quote from the article of Mr. McBride.

> "There is a most compelling motive to urge the early action by utility companies. If the utilities do not take over these sources of gaseous energy and work them into their industry effectively, then the producers of the surplus oven gas, propane and butane, and refinery-still gas are going to look elsewhere for customers. They will discover that hundreds of industrial establishments in the country can use gases with great advantage if offered at less than $1 per million B.t.u. Though these industrial users would perhaps a little rather get their supply from public-utility companies, they do not propose to pay extravagantly for being supplied from a city main. If the utility company does not

exploit the low-cost raw materials to supply them with heat at the minimum practicable price, these concerns are going directly to the primary source of supply themselves, and will make contracts with the natural gasoline producers, and the petroleum refineries that are appropriately located.

"While direct dealing between original producers and industrial consumers seems to have a considerable mutual advantage, it is doubtful that it is as great as appears at first sight. Thus, it is easier for the original producer to have a limited number of large outlets in the form of utility companies with which it can make long-time contracts and to which it can supply under most convenient conditions. Then the users do find a very real convenience in taking their gas from the city mains; they can afford to pay a definite margin above what they would pay for heat from sources not offering the advantages of the utility concern. It is evident, however, that if the utility company is going to serve as an intermediary purveyor of heat it must operate with the most efficient choice of raw material and on a basis of a narrow margin of profit corresponding to the degree of service which it actually renders."

Thus it is apparent that there is need of a much closer relation between our industry and the motor fuel industry. That such a relation is possible to mutual advantage is exemplified by the cooperation that now exists between our industry and the coke industry. It is hoped that the previously referred to committee of the A. G. A. which has been formed with such a purpose in view will aid materially in reaching this goal.

Possible Ways for Utilization

In view of the situation we have been discussing, the next thought which presents itself is to survey the avenues of absorption that the gas industry has for such fuels. The economics of course are the prime factor of consideration and there is no doubt that the gas industry can absorb large quantities of an ashless fuel at a price. Let us consider the possible fields of use.

(Only the high points of Mr. Beebee's discussion can be printed, and these in much abbreviated form.—Editor.)

1. Propane or butane compressed as a liquid can find ready application for most of the uses for which gas is used in both the industrial and domestic field.

2. Generally however from a study of the situation it can be stated that bottled propane for domestic use cannot compete with city gas when the latter is available, except when the cost of the gas is about $2.00 per M. of 550 B.T.U. However, it does have a very definite application for domestic uses beyond the reach of the gas mains. Here it would seem we should welcome this fuel.

3. *Having nothing to offer when people knock at our door is not good for our industry.* It is ventured to say that purveyors of these fuels would welcome cooperation with the local gas companies to mutual advantage.

4. For industrial uses these fuels may offer some considerable embarrassment, especially near the sources of supply. Generally speaking for large industrial use these fuels can be furnished in middle west territory for an equivalent of 50c to 55c per M of 550 B.t.u. gas with the liquid at 8c per gal.

This can be calculated something as follows:

5c per gal. at Oklahoma
3c per gal. freight (Assumed as typical of middle west territory)
8c F.O.B. per 100,000 B.t.u. per gal.
1000 cu. ft. of 550 B.T.U. gas = 550,00 B.T.U.

$$\frac{550{,}000}{100{,}000} \times 8c = 44.0c \text{ per M. of 550 B.t.u. gas for fuel}$$

.5c per M. for preheating
4.0c per M. for Fixed Charges
2.0c per M. for insurance, etc.

50.5c per M.

The above shows how important a part the item of freight plays. As this varies so will the cost of the equivalent gas. To reach eastern markets the freight will be in excess of 5.0c. Every cent per gallon extra adds 5½c per M to the gas produced. The price which the producing company is anxious to receive at the plant has been given at 5c. Therefore in our Eastern market this fuel would have a comparative value of approximately 61.5c per M.

The Question of Proper Rates

5. It may mean revision of our industrial rates to meet the competition but in many cases such a revision is not only a necessity but entirely economic. Except in rare cases, it is ventured to suggest that most large industrial loads can be economically supplied with rates that can compete with this fuel, provided careful analysis of the costs involved are made, especially with modern generation equipment and a willingness on our side to accommodate our operation to new methods and fuels. In those cases where such is not possible, it is evident we must bow to the inevitable. The Gas Industry has long been handicapped by rates of antiquated type. If this fuel does nothing more than force us into the adoption of rates of a scientific nature, it will not have been without benefit.

6. Already considerable work has been done and large quantities of data are available on the use of these fuels in gas making, so that only brief mention of them will be made, since they are all thoroughly covered in the recent A. G. A. proceedings and its various committee work. Generally speaking these fields are as follows:

(a) For re-enriching gas after distribution over long distances, which results in a loss in thermal value, as when a gas line passes under a wide river, or where the compression of the gas has caused a drop in the thermal value.

(b) Two towns in Indiana have been recently supplied by the use of Butane air gas and data on such operation is available in the A. G. A. proceedings.

(c) The Louisville Gas & Electric Company have been doing some very interesting work using these fuels for the production of cheap peak load gas. This work is very thoroughly covered in the 1929 A. G. A. proceedings in a paper by J. F. Duesler.

(d) These fuels have been successfully used for enriching of water gas in place of gas oil, and here at least we find a use which would provide not only a large quantity but continuous demand which to the oil industry is so important.

7. Some developments have recently come to the front which may serve at least to some extent to relieve the situation in the East and provide an outlet for both the gas and propane from the refineries. In the East most of the important refineries are adjacent to large cities, which already have large water gas plants. These developments may have a very important bearing on the problem.

During the past year the United Engineers and Con-

structors, a subsidiary of the U. G. I. Company, built a new plant of this type at Chester, Pa., consisting of 2-11'0" mechanical generator sets having a gross capacity, both sets operating, of 10,000 MCF per day. The following operating results are reported for the month of December, 1929.

Average make per day	5518 MCF
Generator Fuel	11.38 lb. per MCF
Refinery Oil Gas	4.55 Therms per MCF
*Gas Oil	0.26 gals. per MCF
Average B.t.u. Gas Made	528
Average Specific Gravity Gas Made	554
Thermal Efficiency	84.5%

*Some gas oil used due to limited contract amount of refinery oil gas.

Likewise some very interesting recent work being done by W. W. Odell of the U. S. Bureau of Mines in cooperation with the Ohio Fuel Gas Company at Toledo, Ohio, similarly may play a very important part. These latter experiments have been described in a Pamphlet No. RI-2973 just released by the Bureau entitled "Reforming of Natural Gas In Water Gas Generation, with Substantially Complete Elimination of Entrained Carbon."

8. The impressive feature of such a scheme is that the equipment necessary already is standard equipment in practically every gas plant. Further it provides for the absorption of large volumes, since it is concerned with base load gas as well as peak load. The work being done at Louisville which may prove one of the cheapest ways of producing peak load gas also will help to further this development. Furthermore, the reforming of these gases through water gas machines has the advantage of very flexible operation. The tests reported indicate that almost any given condition can be met as regards B.t.u. and gravity by changing the variables controlling the process. This fact alone can easily be one of great importance to the gas industry.

The Economics of the Question

9. (a) So many of the fundamental characteristics of the adoption of these fuels by our industry along this line seem so encouraging, let us take a look at its economics. In doing so it must be realized that this is a problem requiring considerable study and that the figures given below are therefore subject to revision, as further study indicates the need thereof.

Tests of the Bureau of Mines indicate that the energy of conversion of the reformed gas is approximately 82%. Part of this reformed gas goes to reduce the amount of coke used in the process, which coke is utilized with an efficiency of some 70%. Let us assume that the coke is worth $7.00 per ton and with 13,000 B.t.u. per pound.

Further, a gallon of the liquefied gases is approximately a therm or 100,000 B.t.u. Or in other words, for hasty consideration we can talk about a therm of refinery gases, or a gallon of liquefied gases, as containing approximately the same amount of heat and therefore being interchangeable.

(b) $$\frac{\$7.00}{2000 \times 13{,}000 \times .70} = \frac{X}{100{,}000 \times .82}$$

$$X = \frac{.82 \times 700 \times 100{,}000}{2000 \times 13{,}000 \times 7} = 3.15\text{c per Therm or per gal.}$$

Value to the gas industry for replacing coke in water gas.

Part of the gas in the reforming operations goes to enrich the reformed gas and the water gas made. For such use the value of the therm of gas or gallon of liquefied gases is worth to the gas plant an amount equivalent to the value of a gallon of gas oil ordinarily used for enriching, which in most cases approximates 5c per gal. or 5c per therm for the gas used for enriching. Since about twice as much gas is used for reforming as is required for enriching, the fuels from the refinery are worth at the plant to the water gas operator something slightly under 4c per therm for the gas or in other words 4c per gal. for the liquefied gases.

At first thought we would compare the value of refinery oil gas with the cost of making carburetted water gas with gas oil, as just outlined. This, however, is not a true measurement of the value of refinery oil gas in many cases for two reasons. First, the use of heavy fuel oils, of about Bunker "C" grade, for manufacturing carburetted water gas has been successfully developed by the U. G. I. and is now available for use by the industry. Several large eastern utilities are already operating exclusively on heavy fuel oil. Second, the value of refinery oil gas for a base load plant must also be balanced against the value of coke oven gas or coal gas in many cases.

Computation of Value of Refinery Gas

Let us consider the use of heavy fuel oil and from the cost of heavy fuel oil compute the value of refinery oily gas. From average operating results of the two processes the following sample calculation may be made, bearing in mind that a variation in the cost of coke or oil means a variation in the value of refinery gas, since there are many locations where these heavy oils cannot be obtained at the figures given below.

(c) Heavy Oil Operation		
22 lb. gen fuel @ $7.00/N.T.	7.70c	per MCF
3.8 gal. heavy fuel oil @ 2.50c/gal.	9.50c	" "
Total materials	17.20c	" "
Tar Credit 1.0 gal. @ 3c/gal	3.00c	" "
Total Materials	14.20c	" "
Reformed Gas Operation		
10 lb. general fuel @ 7.00/N. T.	3.5c	per MCF
Remaining to purchase 4.8 therms Refinery oil gas	10.7	" "
or	2.23c	per therm

The conversion cost is about the same for both processes, some margin, (10% to 20% possibly) being credited to the reforming process.

This, however, is not at all the final economic picture. Coal gas must in many cases then be balanced against the cost of making reformed gas from refinery oil gas. Coal gas or coke oven gas may be purchased or manufactured by the utilities in most locations, if conditions are favorable. The large cities which are adjacent to the refineries supply a ready market for domestic coke so that the use of oven or coal gas is usually feasible in the same location at which refinery oil gas is available.

It would therefore seem that in locations where coal gas cannot be economically produced the use of refinery oil gas must be compared to the manufacture of carburetted water gas using heavy fuel oil in which case refinery gas will be worth possibly---2c to 3c per therm, depending on the cost of the heavy oil.

Where coal gas or coke oven gas can be made or purchased, the balance may possibly be lower for refinery

oil gas but several studies which have been made indicate that a fair and reasonable price for the refinery oil gas is still approximately - - - 2c to 3c per therm.

(d) The above figures may be considerably lower than the price which the refinery may get when selling these fuels into some of the other fields previously described. Yet it does provide an outlet that would take large quantities and with remarkably good load factor, which in the long run may mean larger profits to the refinery. By locating refineries near to gas plants so that the material can be handled by pipe lines and the propanes handled along with the refinery gases, the profit from such a use can be considerably improved upon due to reduced handling expense of the excess fuels.

There is one other point of consideration of these processes. When utilizing refinery gases rather high in some of the heavy unsaturated hydrocarbons, the capacity of the sets when reforming is applied is approximately the same as when making water gas. However, when lighter compounds, such as propane or methane are utilized, the capacity of the sets would seem to be improved some 15 to 20% so that economies of this nature may be an added asset.

The coordination of the location of gas plants and refineries in the future will have a distinct bearing on the economics of these processes. This has been done in the coke and gas industry. We can all remember when coke plants were located at or near the mines. Developments lately have been entirely the reverse and nearly all the new coke oven plants have been located so that the excess gas can find a ready market. It is ventured to predict that a similar development will take place in the plans of the future gas and refinery plants.

10. From the above, I think you will agree with me that, except in a few cases, the excess concentrated and ashless by-product B.t.u. from a sister industry should do us a great deal more good than harm and by a not too big stretch of the imagination may be one of tremendous economic benefit. This is especially true if both sides are willing to adapt their processes to the needs of the other, particularly with regard to plant location. If this seeming monster actually becomes one, it will be because we have been unwilling to properly harness him so as to become our beast of burden.

Conclusions

1. Liquefied gases and refinery gases will probably continue to be produced in increasing amounts, due to the trends of the oil and motor fuel industry, and its scope will be country wide.

2. The absorption of these excess fuels which are of a concentrated and ashless form by the gas industry would seem to be a logical and probable development by methods which will utilize existing equipment. Methods have recently been developed which give indication of being a solution to the problem.

3. There is urgent need of cooperation and understanding of the problems involved by both the gas and oil industry, so that these excess materials can be absorbed to maximum mutual benefit. Steps are already under way to that end. Modification and adaptation of existing processes will probably be necessary on both sides. The refiner will have need to carefully consider the value of proper plant location, while the gas industry must study the economic and application of scientific rates, particularly for industrial gas loads.

4. This situation which we have been wont to fear, in reality may be one of the best things that has ever happened to our industry, provided we are willing to adapt ourselves to the needs of the situation.

Combatting A Novel Occurrence of Carbon Monoxide

RECENTLY the Pittsburgh Station, U. S. Bureau of Mines, received a call from M. R. Sumner, general superintendent, Byllesby Engineering and Management Corporation, for immediate help in determining the source and kind of gas which had caused a large number of workmen to be overcome at the power station being constructed by the Duquesne Light Company on Brunot Island on the Ohio River near the confluence of the Monongahela and Allegheny Rivers. Although the experiment station was closed because of the New Year holiday, a force of safety specialists, equipped with breathing apparatus, gas masks, and gas detecting devices, was quickly assembled.

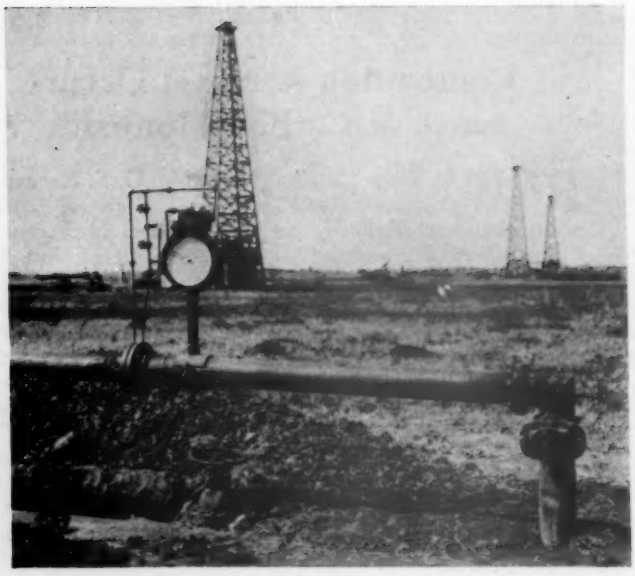
On arriving at the construction project, it was found that the employees affected by gas had been overcome or partially overcome while changing clothes in a change-house before going to work. It was necessary to administer artificial respiration to a considerable number of the workmen and several required hospital treatment.

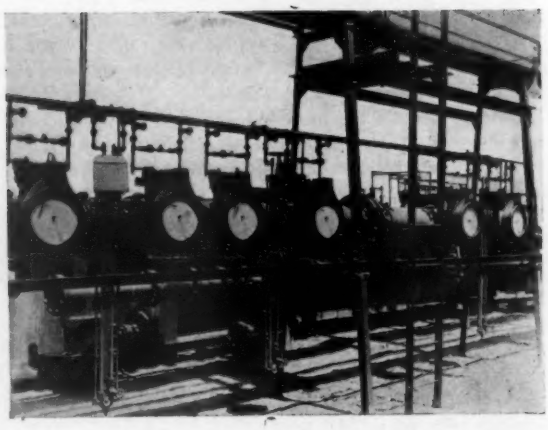
Test made by the Bureau of Mines safety engineers with a carbon monoxide detector showed that there was approximately 1 to 2 per cent of carbon monoxide in the atmosphere of the building, a temporary structure, and an analysis made later by chemists at the bureau's gas laboratory of vacuum air samples collected inside the building closely corroborated this estimate.

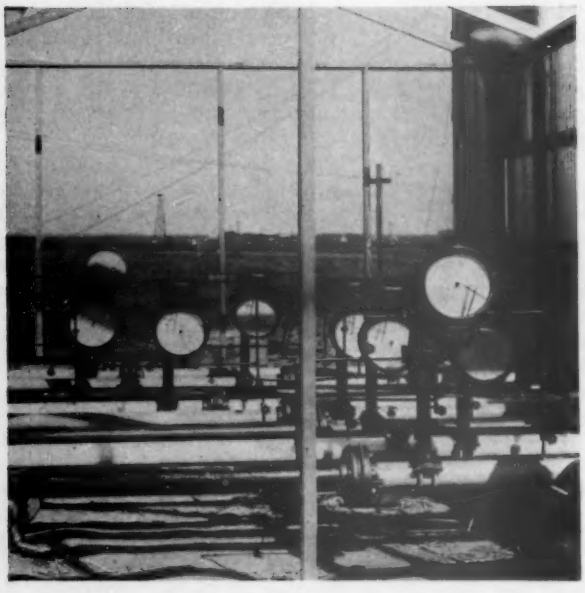
Investigation as to the source of carbon monoxide disclosed one of the most novel occurrences of the gas that has ever come to the attention of the Bureau of Mines specialists. The entire upper end of the island has been formed by the dumping of cinders from a boiler plant operated for a period of at least twenty years. This bed of cinders and ashes is at least forty feet in depth in various places. Various sections of this cinder-ash field had been on fire as recently as two or three months previous. Thus a great area was forming and giving off carbon monoxide, the formation of the deadly gas from the cinders being similar to the formation of water gas.

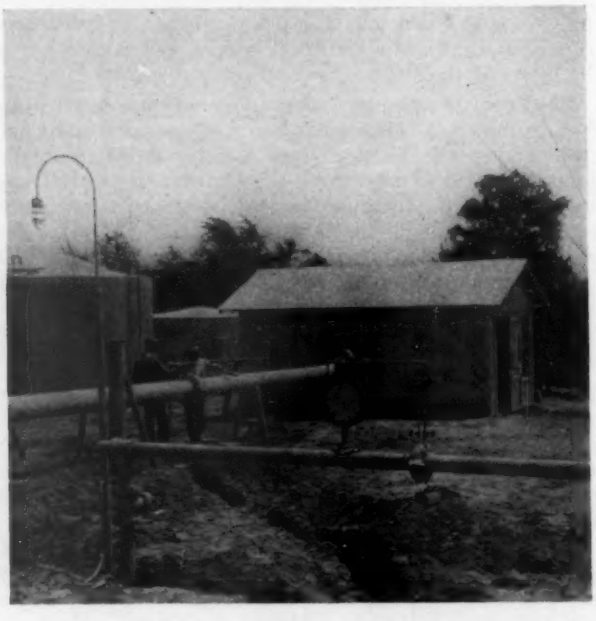
An intake tunnel was being constructed under the cinders-ash field, and the compressed air from the tunnel, under about 7½ pounds pressure, was being forced up through the cracks and interstices similar to the passage of air through a blacksmith's blower. This air movement increased the production of carbon monoxide, the formation of which was also considerably aided by the melting of a fairly heavy snow followed by rain, resulting in little or no air movement on the surface. The change-house in which the employees were overcome was located several feet from the site of the tunnel, illustrating the widespread distribution of the carbon monoxide.

When the situation had cleared up, the Bureau of Mines engineers went carefully over the project with the officials of the company and developed a plan for completing the work, which it is thought will insure against the recurrence of trouble from hazardous gases. As a means of further insurance, the company's first aid team has been given the bureau's course in oxygen breathing apparatus work.









Typical Westcott Orifice Meter Installations

Upper left—Installation for measuring gas from producing well at Three Sands, Oklahoma, near Tonkawa.

Upper right—Installation measuring natural gas into Los Angeles Gas and Electric Company's main plant, Los Angeles, Cal.

Lower left—Battery of meters measuring gas from Globe Gasoline Company's plant at Blackwell, Oklahoma.

Lower right—Fifty inch installations measuring gas to Carter Gasoline Plant two miles North of Cromwell, Oklahoma.

The Accurate Measurement of Gas Flows and the Orifice Meter

HOWARD S. BEAN
Physicist, Bureau of Standards

RECENTLY an engineer expressed a desire for an *accurate* means of measuring the rate of flow of a gas, but unfortunately he did not define his meaning of the word "accurate." Now, if by accurate he meant that the uncertainty in the measurement should be in the order of 1 part in 200 or less, there is little or no present likelihood that his desire will be fulfilled, at least in so far as the commercial measuring of gases is concerned. However, if by accurate he meant that the uncertainty should not be more than 2 parts in 100, (2 percent), then the engineer's desire can be satisfied on commercial scale measurements at the present time and for a great many cases the orifice meter will provide a very convenient means of obtaining this measurement.

The orifice meter is by no means the only gas measuring instrument which will provide this degree of accuracy in the measurement of total gas flows and rates of flow. No one type of meter will meet all conditions, and there are many cases where it would be advisable to use a type of gas meter other than the orifice meter. No further mention of these other meters will be made here since the purpose of this article is to set forth in one place the more important factors to be considered in the installation and use of orifice meters. Moreover in discussing the elements of this type of meter, this paper will concern itself only with those which may be considered primary, that is, the pipe, flanges, plate and pressure taps. No mention will be made of the various indicating or recording mechanisms which are used to translate the pressure measurements into rates of gas flows, as the type of instrument to be used depends much upon the purpose of the measurement. Moreover, the makers of these mechanisms are best able to describe and explain them.

Factors Governing Use of Meter

The orifice meter was at one time considered a rather simple mechanism, and indeed it is in so far as the parts composing the primary element are concerned. However, several years' study of the characteristics of the orifice meter and its behavior under various conditions has shown that its proper installation and use depend upon several factors that require careful attention. There was a time when the orifice meter was generally considered as a cheap method of measuring gas flows, but it has been observed that attempts to obtain such measurements cheaply are in the end expensive. When this work is intrusted to uninstructed and unskilled employees it is very likely to become a source of trouble. It is definitely known that there are no less than 8 independent factors that may directly affect the indications in a greater or less degree.[1] These factors are: 1, The ratio of the orifice to pipe diameter; 2, the rate of flow, as indicated by the ratio of downstream to upstream pressure; 3, the location of the pressure taps; 4, the location and character of fittings in the pipe line near the orifice; 5, the condition of the orifice edge; 6, the ratio of orifice edge width to orifice diameter; 7, steadiness of the flow; 8, physical properties of the gas. The order in which the factors have been named has no significance. This article is not comprehensive enough to justify a discussion of the manner and direction in which these several factors may affect the orifice meter indications, but based upon these effects some suggestions will be given on the installation and use of the orifice meter.

Consideration of Pipe Sizes

Selection of Pipe.—While most orifice meter tests have been made with pipes ranging from 4″ to 16″ there is no apparent reason why these should be considered as size limits in either direction. It is very important that the pipe sections adjacent to the orifice flanges shall have as smooth an inner surface and be as nearly round as it is possible to select. While it may not be essential, it is very desirable with the smaller sizes, 4″ and under, to use a short section of brass pipe next to the flanges. 5 to 12 feet on the upstream side and 2 to 4 feet on the downstream side would be sufficient.

Selection of Orifice.—The code on orifice meter installation printed by the American Gas Association, Natural Gas Department, states that the ratio of the orifice diameter to the pipe diameter should not exceed 0.6. That is a good rule to follow, for the present at least. The minimum orifice diameter used should not be less than ½ inch, unless the orifice is individually calibrated. It would be very desirable to calibrate individually all orifices under 1″ in diameter.

The condition of the upstream orifice edge, particularly on orifices of ½″ to 2″ diameter, will have a considerable effect upon the indications. This edge must be as square and free from burrs as it is possible to

Publication Approved by the Director of the Bureau of Standards of the U. S. Department of Commerce.

[1] *Measuring Large Volumes of Gas, by Thos. R. Weymouth, Natural Gas, June 1929*

make it. Even with very good machine shop practice the variations in the condition of the edges of a group of orifices of the same size, within the range mentioned, may cause variations in the gas flow indications of ±1 to 2 per cent. On larger sizes of orifices this edge effect will be proportionally less, possibly not exceeding ±½ per cent where the orifice diameter is over 4".[2]

The ratio of the width of the orifice edge (or in some cases the thickness of the orifice plate) to the orifice diameter should not be greater than 1 to 8.

Installation Requirements.—When installing an orifice meter there should always be a straight run of pipe on the upstream side of the orifice having a length equal to at *least* ten times the inside diameter of the pipe. A set of straightening vanes should be installed in this straight run of pipe if on the upstream side of it there are several elbows, a valve, regulator, or some other type of fitting. The location of the straightening vanes should be such that the distance between the vanes and the orifice is about twice that between the vanes and the upstream end of the straight run, but in no case do they need to be over 15 pipe diameters from the orifice plate. The general dimensions of the vane should comply with the following: (a) The maximum transverse dimension across any passage of the vanes should not exceed ¼ the inside diameter of the pipe; (b) The length of the vanes measured along the axis of the pipe should be at least ten times the maximuum transverse dimension of any passage. While the walls of the vanes may be of thin material they must be rigidly constructed and the vanes should be very securely fastened into the pipe.

Location of Pressure Taps.—There are three pairs of pressure tap locations in general use. They are: 1, flange taps, which are $1\frac{1}{8}$" from the bearing face of each flange. 2, throat taps, placed 1 pipe diameter upstream from upstream face of plate and ½ pipe diameter downstream from the upstream face of orifice plate. 3, pipe taps, or full flow connections having the upstream tap 2½ pipe diameters from the orifice and the downstream 8 pipe diameters. In connection with the location of pipe taps, it may be helpful to note that the distance of 2½ and 8 may be varied by at least a half pipe diameter either way without causing any appreciable effect upon the pressure readings.

Merits of Various Taps

With the same flow of gas the differential pressures obtained with flange and throat taps are almost equal, while that obtained with the pipe taps is lower. There is very little if any difference in the accuracy which can be obtained with the different pairs of taps. In cases where it is desirable to have a fairly low overall pressure loss it will generally be desirable to use either the flange or throat taps since they would give a higher differential reading than the pipe taps for any given flow. Where the whole set up must be made in the field the pipe taps have the advantage that an inch or so variation in their location is of no consequence.

In all cases it is essential that the pressure tap opening on the inside of the pipe shall be free from burrs, and if possible the edge of the tap hole should be very slightly rounded.

Conditions of Flow.—The gas flow should be steady and entirely free from pulsations. Numerous attempts have been made to find a way of measuring a pulsating flow of gas with an orifice meter. A certain degree of success has been attained in some cases, but as yet no method has been shown to be entirely reliable. It is also desirable that there should be no sudden changes in the rate of flow, although this cannot always be avoided. The gas stream should be free from fog or condensed liquid particles as the presence of these will cause the meter indications to be almost meaningless.

Physical Properties of the Gas.—It is essential to know the density or the specific gravity of the gas. The best method of determining the specific gravity is with a gravity balance. If the line pressure at which the measurements are made is over about 75 pounds it will be desirable to make a correction for the super-compressibility of the gas, that is its departure from Boyle's law. This correction may be determined for any given gas by a compressibility apparatus such as described in a recent issue of the Oil and Gas Journal.[3]

Set-up of Orifice Meter in field for studying Natural Gas Measurement under high Line Pressures

The viscosity and ratio of specific heats are also included in some discussions on the effects of the physical properties. The effect of viscosity may be ignored except in the case of very small orifices and extremely low rates of flow.[4] The ratio of the specific heats has been used in some theoretical discussions of orifices and other flow meters but is generally omitted from consideration in commercial measurements.[5]

Selection of the Coefficient.—The selection of the coefficient to be used in computing the flow through an orifice meter will, of course, be governed by the pressure tap location and orifice diameter ratio. Values for these coefficients are given in the handbooks published by the meter manufacturers, or the values given in Bureau of Standards Research Paper No. 49, "Discharge Coefficients of Square-Edged Orifices for Measuring the Flow of Air," may be used.

Conclusions.—There is still much to be learned about orifice meters and numerous organizations and individuals are conducting researches on the subject. When all of the information thus being accumulated has been assembled, it is very likely that the limits suggested in the first of this paper as defining "accurate" measurements by orifice meters may be narrowed considerably.

[2] *Durchflussbeiwerte der IG—Messmündungen für Wasser öl, Dampf and Gas, by Dr. R. Witte, Sonderabdruck aus der Zeitschrift des Vereines deutscher Ingenieure. Bd. 72 (1928) Nr. 42 S. 1493.*

[3] *Determining Compressibility of a Gas, by H. S. Bean, Oil and Gas Journal. January 16, 1930.*

[4] *See Section XXIV Bureau of Standards Research Paper No. 49. Discharge Coefficients of Square-Edged Orifices for Measuring the Flow of Air.*

[5] *Quantity—Rate Fluid Meters, by Ed S. Smith, Jr., Presented at annual meeting of Am. Soc. of Mechanical Engineers, December 1929.*

Gas Dispatching As Practiced by The Detroit City Gas Company

HOWARD N. WIEST

Chief Dispatcher, Detroit City Gas Company

THE Detroit City Gas Company is a public utility serving 404,000 consumers located throughout 463 square miles of territory in the City of Detroit and the county of Wayne, Michigan. The spread of the territory and the many uses for which the gas is consumed create an especially variable demand, effective not only during the hours of the day, but likewise from day to day and from month by month. Coupled with these variations is the constantly increasing sendout experienced every year, such increase of course, not following a fixed rule as to a definite quantity year by year, nor a fixed ratio for the months of the year.

The problem arising from such a variable sendout to such a spread of territory has caused the development of a highly specialized Dispatching Division, the duties of which may be separated into three general classifications. It supervises and directs primarily the transfer of gas from the Manufacturing Plants to the individual Pumping Plants and Holders which are located in different parts of the territory. Also it directs the amount of gas to be pumped and pressures to be maintained at all times upon the various consumption districts. These duties are followed throughout the 24 hours of the day. The second purpose of the Dispatching Division is to daily work up an estimate of the required amount of gas to be made for the day, and to assign a proper portion of this make to each of the Manufacturing Plants. The third purpose of the Division is to work up preliminary weekly calculations of receipts and makes to meet the expected demand. The Division consists of a Chief Dispatcher and four assistants and is a subdivision of the Pressure Department which is in turn a section of the Distribution Department.

Handling Manufacture and Distribution

To understand the points of contact the Dispatching Division has with the other departments of the Company one must gain an idea of the manner in which the manufacturing and distribution work is handled. This Company receives makes of gas from four of its own manufacturing plants and from three coke producing concerns. Each of the manufacturing plants also serves as a pumping station for its surrounding district and further transfers gas to six other pumping stations located adjacent to the particular district to be supplied. From the outline given it may be seen that there are seven points of receipt and ten points of distribution.

About seventy-five percent of the gas used each day is consumed between 7 o'clock in the morning and 7 o'clock in the evening. Since the manufacture of gas is economical only when produced at a uniform rate, the holder space available must be economically made use of to store gas during the hours of the night, ready for withdrawal to meet the greater demands of the daytime. As the average daily consumption of gas on Monday and Tuesday is a greater quantity than the average daily consumption on Wednesday, Thursday and Friday, and is still other quantities for Saturday and Sunday, it may be seen that the economical use of Holder capacity requires also that the manufacturing load be economically distributed from the beginning to the end of the week.

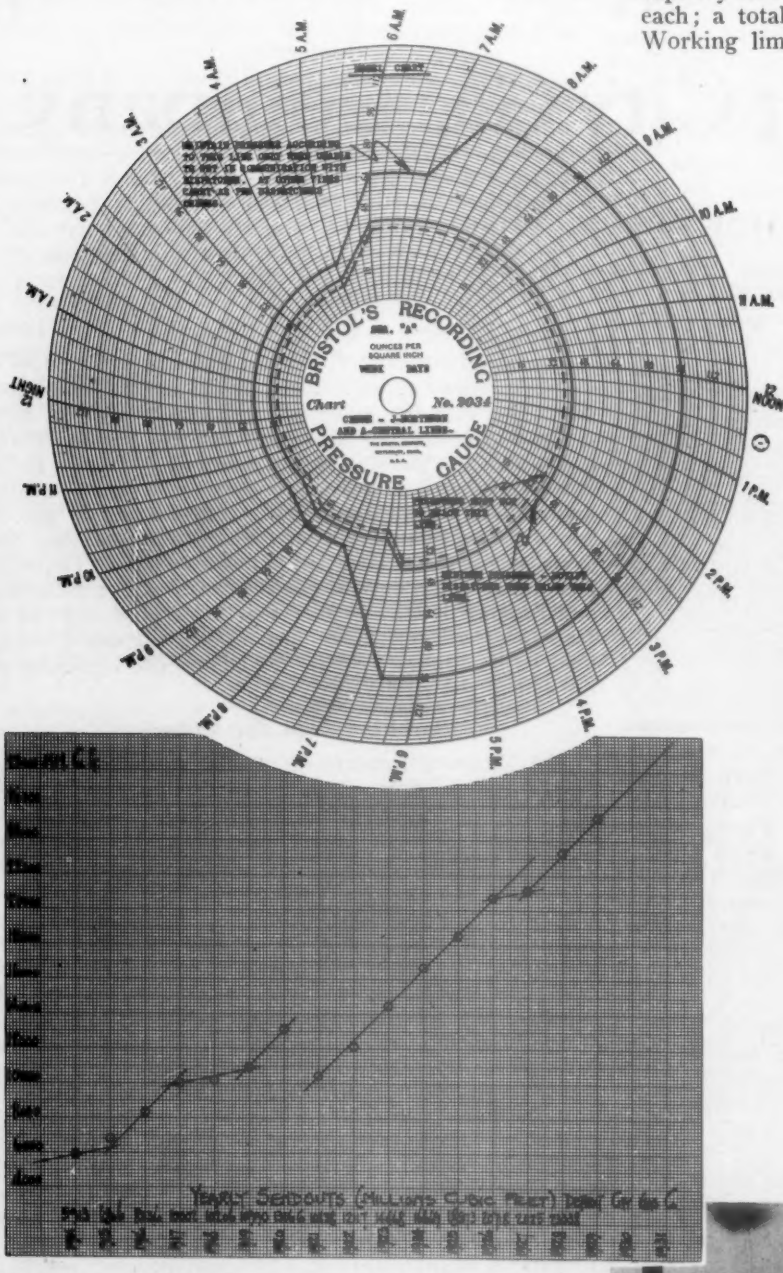
Looking Into the Future

The Pressure Department determines what pressure must be carried throughout the various districts in order that an even and definite supply shall be maintained at all hours and under all conditions of consumption. That Department watches closely the city building activity and changes of demand. It bears in mind the size of street mains and the supply through all the piping of the territory, determining how best to eliminate points of low pressure and insufficient supply as these occur, because of growth and alterations in sections served. Having determined upon pressures to be maintained it makes up Model Charts showing minimum pressures below which each particular Pumping Station shall not permit pressures to fall. Ordinarily pressures are maintained at whatever amount the Dispatcher directs over the telephone, but during intervals between instruction station attendants are responsible for observations of results.

Very often the pressures to be maintained are only slightly above the minimum permissible. At other times station attendants may be responsible for observations of pressures upon lines into which they may not be pumping. The Model Charts also show pressures which are to be maintained throughout the various hours of the day should the station be unable, because of failure of communication, to get in touch with the Dispatcher on duty. It is, of course not the pressure at the station that is usually of importance, but rather the pressure at the appliance of the furthermost consumer, or it may be the pressure at some appliance located in the heart of the city among a maze of interconnecting lines from which many consumers are taking gas at the same time. To insure pressures sufficient to keep adequate supply at the inlet of these appliances is the object of having a minimum permissible pressure shown

upon the Model Chart in effect at the pumping station.

During the daytime each of the stations is pumping to its own district, but at night it is possible to shut down some of the pumping plants, combining districts so as to carry more than one district with one plant. In connection with this the transfer of holder gas stock from one point to another is a matter for consideration. With lessened consumption at night it is possible to transfer gas more easily and with less pumping pressure, hence the transferring of gas to the district holders is done chiefly after 7:00 P.M. Because of loss in line pressure it is not possible to fill outlying holders hurriedly, which requires that in preparation for full holders each Monday the outlying ones must be filled before Sunday.

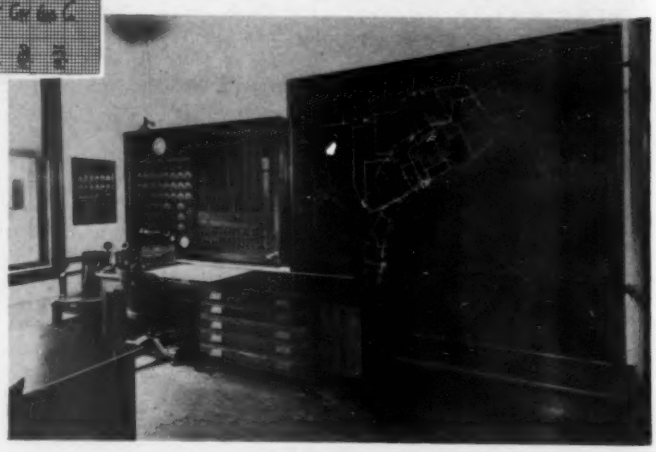


Above—Sample of Model Chart; below—graph of yearly send-out

The Company has ten gas holders; one of which is of one million cubic feet capacity; six of three million cubic feet capacity each; one of six million cubic feet capacity and three of ten million cubic feet capacity each; a total of fifty-five million cubic feet capacity. Working limits hold the available maximum total to about fifty million cubic feet and the working minimum at sixteen million cubic feet. The daily and weekly range must lie within these figures; starting each Monday morning with full holder stocks, losing on total stock during the heavier demands at the beginning of the week and making up stock during the lighter demands at the end of the week. The greatest differential on this scale is thirty-four million cubic feet. In other words, total holder stocks between morning and evening and between Monday and Saturday must not step out of this range. With average sendouts recently of about seventy-five million daily, and fifty-five million of this sent out before 7 o'clock in the evening the Dispatching Division, in the calculation, played an important part in producing uniform plant operation.

Effect of Weather Changes

The Dispatching Division must, of necessity, recognize the vagaries of the weather, following closely the daily and weekly forecasts furnished by the U. S. Weather Bureau and applying these forecasts to the solution of problems involving its own estimates. The daily forecasts furnished by the U. S. Weather Bureau are of value in determining variations that may be expected in the day's sendout. The weekly outlook furnished by the Weather Bureau is of value in determining what load to have the manufacturing plants expect throughout the coming week's time. The meteorological reports made up by the Government are of value in determining what kind of seasonal weather to anticipate.



Operating Equipment in Gas Dispatcher's Office.

Each year in Detroit there is experienced a three-day period of maximum demand. This three-day period usually occurs during the month of May. Occasionally it occurs in September. These two months also have other consecutive three-day periods of large proportions. In May and in September consumers do not have much fuel in their coal and coke bins and warm weather preceding may have caused them to shut down on house heating entirely. Suddenly a cold spell occurs and the quickness with which it enters and the severity with which it is maintained determines the quantity of gas that the consumer is going to use in getting the required heat into his home, be it from the kitchen gas range, the Radiantfire Heater or the gas fired furnace.

Why Alertness Is Requisite

The increasing popularity of gas fired furnaces and their steady increase in numbers in Detroit is one item alone that is greatly accentuating the sudden demands of any cold spell at any time of the year. Because gas is a commodity that the consumer requires be delivered immediately on demand, a three-day period of continuous heavy demand in months not ordinarily making that demand produces a need for special vigilance by both the Dispatching and the Manufacturing Departments. A drop in temperature, when accompanied with a high wind, is especially provocative of a sudden increase in demand. Weather predictions cannot often give definite information as to the strength of wind that is to be effective and for this reason, at such times, calculations must be foregone and a system of unusual preparedness adhered to. During the months of September and May the Dispatching Division adheres to a policy of starting ample gas making equipment every morning and then as the day progresses, taking off equipment in the amount that consumption of the earlier part of the day shows will not be needed. A ruling is in effect during those two months which requires the placing in service of additional gas making water gas machines any time actual total holder stocks fall five hundred thousand cubic feet below the amount of stock calculated to be on hand at that time. Likewise, if holder stocks exceed the calculated amount by five hundred thousand cubic feet some gas making equipment is shut down. The Dispatcher has previously estimated the day's sendout and pro-rated this total sendout by two hour periods to make up the total. Holder stocks and gas receipts for the day have likewise been prorated and the Dispatchers' sheet shows exactly what sendout and stock is expected during each two hour period through until 7 o'clock the following morning. A day of maximum demand is in effect without notice, and not until the Dispatchers' records at 9 o'clock and 11 o'clock in the morning show what the demand has been for those periods is it possible to know that the demand for the day is likely to be far in excess of the previously predicted amount.

Since additional equipment not previously made ready cannot come into effect under a shorter time than three to six hours, it has been the policy to have ample gas making equipment in service at the start of all such possible days, and as above indicated that policy is in effect all during the month of May and for the greater part of September.

Entries Made in Dispatcher's Log

The Dispatchers' log entries are recorded upon a large sheet of heavy paper, 24 x 32 inches in size, and ruled to receive notations regarding the following items—Holder stocks in each of the gas holders—Meter readings of gas receipts—Number of street pressure pumping units working and the speed at which they are operating—Pressures showing at the main points of the high pressure distribution system—B.T.U. and gravity of gas received and pumped out at different Stations—Out-door temperatures and barometer readings—Data regarding the operation of water gas sets—Notations of orders given and a record of miscellaneous information received. Holder readings, street pressure unit readings, B.T.U. and gravity reading, temperature, barometer and water gas set operations are checked every hour throughout the full twenty-four hours of the day. Meter readings, two hour period sendout and accumulated sendouts are recorded each two hours during that time. These Dispatchers' sheets are kept on file available for ready reference for five years.

At the beginning of each week a Dispatcher's Weekly Letter is made up, showing estimated sendouts for each of the days of the coming week, anticipated purchased gas receipts and coal gas makes, the total amount of water gas to be made each day, the amount of water gas to be made at each of the manufacturing plants for each day, the total holder stocks calculated for the start of the day, the minimum holder stock estimated for the evening of the day, any notes regarding out-of-the-routine operations, and finally the number of water gas machines to be kept under fire at the different Manufacturing Plants to accommodate any unexpected increase of demand over that of the routine operation scheduled. A copy of this weekly letter is sent to each manufacturing plant superintendent and to others interested in plant supervision.

How Daily Sendouts Are Determined

The method of determining daily sendouts for the week may be of interest. Having previously determined what the percentage increase or decrease will be for the month compared to the same month of the previous year, the resultant estimated total sendout for the month is obtained. This figure is divided by the number of days in the month and the quotient then multiplied by seven to give the total sendout for what is to be called a typical week. The Dispatcher has on hand a record made up from past experience which indicates what percentage of the total month's sendout occurs on the first Monday, the second Monday, etc., and the same for each day of the week in that month. Looking these over he averages the Mondays and determines the sendout for Monday of the typical week. The same is done for the other days of the week. In that way a week typical of all the weeks of that month is obtained. Coal gas and purchased gas receipts are likewise calculated, leaving the water gas load as a remainder which is then shown with desired proportional assignment to each manufacturing plant.

This set-up shows the operating conditions which will be typical of all the weeks of that month and this is what is expected will hold if weather conditions are at the mean normal temperature for that month. If actual results, as the month progresses, show that the percentage of increase or decrease assumed was either too high or too low the sendout for the actual week under consideration is adjusted to make the percentage agree with results developing. If the Weather Bureau outlook advises of abnormal temperatures or conditions the estimated sendouts for the days to be affected are altered to take the forecasted conditions into consideration. In this way, with the week of the estimate running concurrent with the week of the government

weather outlook, it is possible to have the estimated total sendout for the week usually within five million of the actual figure and seldom as far in error as fifteen million for the week.

Monthly Basis Gives Best Results

From the description of the making up of a typical week it may be observed that the Dispatching Division is using the monthly total sendout as the basis of calculation. Of the twelve months in the year most of them have fairly stable characteristics year after year; at least sufficiently uniform so that in determining the total sendout for a coming month one may feel that the figure will be fairly close. What is meant is that it is more accurate to determine upon the months sendout as a whole and pro-rate that figure into weeks and days than it is to start at estimated daily figures and build up weeks and months from these. Graphs of sendouts for like months present one means of eliminating the uncertainty occasioned when estimating sendout by using figures alone.

The Dispatchers' monthly prediction is made up to give a preliminary estimate one month ahead of time of items similar to those mentioned in the description of the weekly estimate. At the close of the month the actual results are tabulated in parallel with those estimated and a comparison is thereby shown which serves as a guide for computation of future months. On the back of each final monthly report a tabulation is made of items applicable to that month and for the year since January 1st. These items list the source of receipt of Purchased Gas, Coal Gas and Water Gas and opposite each of these is stated the minimum amount received on any day this year to date, the maximum so received, and the total cumulative receipts of each to date this year. Similarly the minimum single day sendout to date and the maximum single day sendout to date, the minimum consecutive three-day average and the maximum consecutive three-day average. Then follows a list of the minimum and maximum single days for each month so far for the year, and of minimum and maximum three-day averages for each month so far. Next is listed the gain or loss percent in sendout of each month over the like month of year previous and the cumulative gain or loss percent of the year to date. The total sendout in cubic feet for each month and the cumulative sendout for the year is also shown.

All of these items are of especial value at the end of each month because they permit all departments to know at a glance the status of gas receipts, makes and sales and to govern their activities accordingly. As previously mentioned, the rapid growth of Detroit, the fluctuations in the business barometer, and the pronounced variations in weather occasioned by its geographical location all demand that close check be kept upon all the items pertaining to gas sendout. Plant extensions of major importance usually require a year for design and a year for construction and this means that the need for them must be closely gauged two years in advance of actual requirements.

Effect on Raw Materials Delivery

Dispatchers' estimates have much to do with the dates for delivery on raw materials. A few figures on the amount of materials received by the Company are as follows: About two hundred cars of oil per month; five hundred sixty cars of coal per month; and from five hundred to one thousand tons of pipe per month. Carried in stock, the Company keeps about ten million gallons of oil and eighty thousand tons of coal. A total of nine thousand two hundred forty-seven carloads of materials were received during 1928.

Early each day the Chief Dispatcher makes up a small form showing what the resultant sendout, holder stocks and B.T.U. have been for the day just closed. These daily reports go immediately to the supervision personnel of the Company that they may keep closely in touch daily with the conditions of sendout, distribution and manufacture. Desirable changes in operation may be thereby intelligently made at the start of the day.

The Dispatchers' office is a separate room located on the fourth floor of the main gas office building downtown, this room being located adjacent to the supervisional offices of Engineering, Manufacturing and Distribution. Desks, files, maps, indicators bulletin cases, and switch board go to make up the equipment. Upon one wall is a large map showing the layout of the high pressure distribution lines of the system, upon which also are shown the locations of the main gate valves that control the flow of gas throughout the system and the locations indicated of pressure reducing governors which step the high pressure gas down into the low pressure system. The material upon which the map is drawn is of "battleship" linoleum. The back ground is painted green and the pipe lines are indicated in white enamel paint. The map is drawn quite closely to scale with the size of the mains indicated by the width of their corresponding lines. Valves, when closed are so marked by having red map-tacks placed upon them. When discussions arise regarding points in connection with the distribution system this large scale wall map is usually the first place of reference, being made use of much as a blackboard in a classroom.

An Ingenious Tell-Tale

An interesting piece of equipment in the Dispatchers' office is a glass case enclosing a series of ribbons made up to represent the Company's gas holders. Each ribbon operates over a thumb spool the height of the ribbon being adjusted each hour to indicate the gas content of the holder it represents. At a glance the amount of gas stock in each holder is known. A wide separate ribbon is indicative of total gas stock on hand.

Another apparatus is a system of panel lights connected up to display the operating status of each pumping unit and water gas set at the Company's stations. Different colored lights show for each unit and are set to indicate whether running, down under fire, down cold, or down under repair. Nearby is a panel with radio dials attached, an arrow on the dial being adjusted to point to the pressure being carried on the high pressure main it is labeled to represent.

In a separate bulletin case white celluloid letters are made use of to state the expected sendout of the day; the expected gas receipts and gas makes; the total holder stocks at the start of the day and at 7:00 P.M.; the increase in sendout for the year up to the first of the like period one year previous; and the increase or decrease in sendout for the year up to the first of the present month.

The holder ribbons, equipment lights and pressure dials are adjusted hourly to show immediately to anyone coming into the office what the manufacturing storage and pumping situation is. The information given in the bulletin case is posted daily at the beginning of the day. From the foregoing it may be seen that the operating and distribution situation is discernible quickly and definitely.

The Dispatchers' switch-board gives direct and uninterrupted telephone communication with an engine room in each of the Company's plants. Over these wires each hour come reports on the items the Dispatcher records on his log sheet. Over these wires also come the first news of interruptions and irregularities of operation. Desk telephones connect the Dispatcher both with the Company's main switch-board and with outside telephone exchanges; not for the volume of business done over these telephones but experience has indicated their necessity for uninterrupted service.

Most visitors to the Dispatchers' office learn for the first time that here is a part of the business that is seldom heard of. So little has been published about the details of this part of the business that the public in general has the feeling that gas making and distribution presents but little change from one day to the next. If any customer has his attention called to the difference in the volume of gas he himself uses from one day to the next—between winter and summer—between wash day and Sunday—Thanksgiving Day compared to the Fourth of July—warm days compared to blizzard weather—and then is told that there are in Detroit about 404,000 other customers creating a like variation in gas consumption, then it is for the first time that he realizes what such a variation may mean as a manufacturing and distribution procedure. Not until he is told about it does he begin to realize the amount of forethought that must be expended to properly calculate the requirements under the conditions mentioned. Coal and oil and other materials of gas manufacture must be properly contracted for and delivery made in the proper amount and at the correct time. In a territory growing as rapidly as the City of Detroit the enlargement of plant facilities is a major item in addition to that of distribution extension and alteration. With the average day increasing at the present time seven millions of cubic feet or more each year existing facilities for manufacturing, pumping and distributing very quickly become insufficient to meet the growing demand, and increased facilities must be placed to accommodate the increase. Inaccurate estimate of future demand may easily prove highly expensive on these items.

House Heating Closely Watched

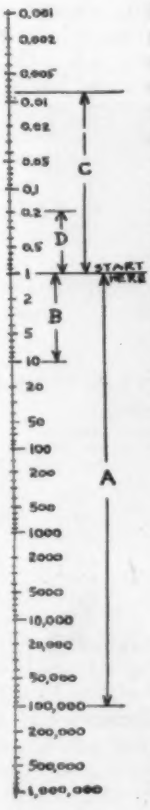
Detroit, so far as the gas business is concerned, is a city of homes and of steel manufacturing and fabricating processes. Because the city is one of individual homes the household custom of using the kitchen gas range and the Radiantfire as a source of quick heat supply has an effect more noticeable than when the dwellings are more of the apartment and terrace type. The Company is watching closely the variable demand being created by the increasing number of gas furnace house heating installations. With industrial furnaces using large quantities of gas in steel heat-treating work, japanning, bread and cake making, automobile motor block testing, and soft metal melting the consumption on these operations, although subject to variation in a minor way because of temperature, are more specifically subject to daily and seasonal changes, resulting from changes in manufacturing and business conditions.

It may be seen from this description of the activities of the Dispatching Division that its work deals entirely with the present or the future. Directing the delivery of gas from the current day is the work in the present; instructions and load assignment is work being done for tomorrow and the coming week, while the planning and calculation of estimates for months and years to come is work for the distant future. It may be seen that such activities cannot be other than very interesting. Never for a moment can interest lag, for to overlook or not give proper weight to some factor, based upon experience of the past, will cause inaccurate estimates and more or less uneven operation will result thereby. It all means that with the Dispatching Division eternal vigilance is not only the price of safety but the price of economy as well. To its personnel no reward is more gratifying than to see the actual results, as they develop, follow closely to the estimates.

Any Root or Any Power of Any Number

IF YOU will take any slide rule and lay it end to end nine times and each time lay off the principal dividing lines you will have a chart exactly like the one shown excepting that yours will be much longer and therefore it will be much more accurate. That is what I did in preparing this chart. Then I reduced it to this much smaller size. By following the above method you can make a chart that will go into the billions, trillions, or higher, as one limit; and a billionth, trillionth, or lower, as the other limit. There is no limit in fact. Then to keep track of the digits you simply read the numbers exactly as they stand on the chart. No juggling of digits is necessary. I do not know of any other method that is as simple as this. All other methods require "juggling of digits," as they say.

For example, what is the 5th root of 100,000? Measure the distance A from 1 to 100,000 as indicated on the chart. The distance B must then be exactly 1/5 of the distance A and there is your answer, namely, 10. In other words, divide the distance A by the root and the quotient shows you the distance to measure from 1 to find the answer. Always measure from "1" in either direction. "One" is always the starting point. To extract the square, cube, or other root of fractions is usually more complex than extracting roots of whole numbers. However with this chart one is just as easy as the other.



For example, what is the cube root of .008? Measure the distance C from .008 to the starting point "1" and divide it by 3 and you get the distance D which tells us that the answer is 0.2.

A method that is as easy as any to find a third, fourth, fifth, etc., of any distance, is to use a pair of dividers. Adjust the dividers until you get the distance D exactly ⅓ of the distance C and the chart gives the answer without any mathematical calculations whatever. With this chart you can determine the 3.127 power for instance—ANY power in fact. And you can extract the 4.37 root of any other root, all without mathematical jugglery. The "beauty" of it is: You have everything before your eyes in black and white.—*W. F. Schaphorst.*

Gas for Baking Radiator Cores

A general resumé of the subject supplemented by some actual operating results

LAWRENCE E. BIEMILLER

Supervisor, Fuel Sales, Consolidated Gas Electric, Light & Power Company, Baltimore

ONE of the operations for which Industrial Gas has recently come into increasing favor is the baking of cores. With the development of the metal industries, particularly the automobile, the use of highest quality cores has become of very great commercial importance. Gas has proven to be the ideal source of heat for core baking, and is used in many different types of core baking ovens, depending upon the size and type of core, as well as the quantities in which they are to be baked. A very interesting installation of core baking ovens is in the plant of the Republic Radiator Corporation in Baltimore.

A radiator section is a very difficult casting to make, because of the very thin walls for its relatively large area. This makes it essential that as perfect a core as possible be used for these castings. Cores are made from a mixture of sand, linseed oil and water in about the proportions 66 to 1 to 1. Just enough linseed oil is used to constitute a binder when dry, and enough water to permit shaping. This core mixture is shaped in a form, one-half of which constitutes a pan. Then the pan with "green" core is inserted in an oven and baked for about two hours at about 400° F. This dries out the water and oxidizes the oil, so that the finished core can be removed and used without losing its shape or breaking. A large production of cores baked to exactly the desired condition is dependent upon careful heating in an oven having good heat distribution and easily controlled temperature.

With this in mind the Republic Radiator Corporation several years ago installed four gas-fired ovens of sheet metal construction with very thick insulated walls and a minimum of "through metal." Their inside dimensions are 7 x 14 x 8 feet, and they are each supplied by eight bar burners using gas at one pound pressure from a Roots compressor. These are truck type ovens, that is, the cores are loaded on trucks which are wheeled into the ovens, remain there for the bake, and are then wheeled out again. These ovens are very easily controlled ensuring exactly the correct temperature maintenance at all times. The temperature distribution is also very good, so that cores on all parts of the truck are equally baked.

These ovens were so satisfactory that when it was necessary to increase their oven capacity due to greater production, the company naturally decided to install additional gas ovens. Therefore, two core ovens were built made of brick with 4½ inches of Silocel insulating brick and well-insulated heavy steel doors. These are also each fired by eight bar burners. Again gas at one pound pressure was used, for it eliminated the necessity of supplying air under pressure, and gave a single valve control with proportional mixing. This results in the maximum efficiency of combustion with no heat loss due to either an insufficiency or excess of air. These ovens were so successful that in the summer of 1929, two more, alike in every detail, were installed. Of course gas was again selected as the fuel.

In order to determine the efficiency of these ovens a very complete test was recently run for a twenty-four hour period, during which some ovens were in use thruout the first twenty-one hours. The results are tabulated below:

TEST OF CORE BAKING OVENS

Oven Number	Hours Actually Baking Cores	Cu. Ft. Gas Consumed	Pounds Core Baked (dry basis)	Pounds Wet Core	Pounds Water Evaporated etc.	Number of Cores	Cu. Ft. Gas Per Pound Dry Core
1*	12.68	10,700	4530	4877	347	711	2.38
2*	11.22	9,480	4684	5047	363	732	2.02
3	14.58	12,320	6928	7417	489	1097	1.78
4	14.00	13,050	4854	5177	323	819	2.69
5	16.45	13,900	6442	6870	428	891	2.16
6	14.73	12,470	6256	6693	437	935	1.99
7*	7.16	5,750	2107	2287	180	338	2.72
8*	9.16	6,660	2315	2466	151	475	2.89
Total	99.98	84,300	38116	40854	2718	5998	

* Ovens No. 1, 2, 7 and 8 are brick, the others are of sheet metal. Gas is 500 B. t.u. Manufactured gas.

Cu. ft. of gas per lb. Dry Core—2.21
Cu. ft. of gas per lb. Wet Core—2.06

These results are shown in summarized form below:

	Total # Dry Core	Avg. # Core Per Oven	Total Gas Consumption Cu. Ft.	Cu. Ft. Gas per Pound Dry Core
Ovens 1 and 2	9214	4607	20180	2.19
Ovens 3, 4, 5, & 6	24480	6120	51740	2.11
Ovens 7 and 8	4422	2211	12410	2.81

Ratio of weight of iron (trucks and core pans) to dry cores—7 to 1.

(In comparing thermal efficiencies or gas used per pound of core, the relative iron to core ratios must be taken into consideration.)

Battery of Gas-fired Core Ovens

The following conclusions can be drawn from the foregoing figures:

1. When used for such a very large proportion of the twenty-four hour day, the brick ovens are just as efficient as the sheet metal ones. This is of interest because it is a generally accepted fact that the latter are very much more efficient than the former, when operated for a day of eight hours or less.
2. The ovens in which only a much smaller amount of cores were baked showed a very decidedly higher gas consumption. This shows that as few ovens as possible should be used. In this case six would have been sufficient. If only six had been used, and thus all ovens averaged 16 total gas consumption would probably have been reduced 5 to 10%.
3. The gas consumption per pound of core in this type of core baking is relatively high due to the very high ratio of weight of truck and core pans to that of the cores.

The first gas heated core ovens were installed to secure better cores than were obtained from the coke fired ovens then in use. Today almost 100 per cent perfectly baked cores are obtained, with a minimum of either green or burnt cores. This is thought to be due to the very even heat distribution and to the control obtained from the combustion system in use. Believing that the best cores result from a reasonably slow bake, the orifices in the mixer boxes are of such a size as to reduce the probability of burning due to an oversupply of heat in the initial stages of the drying.

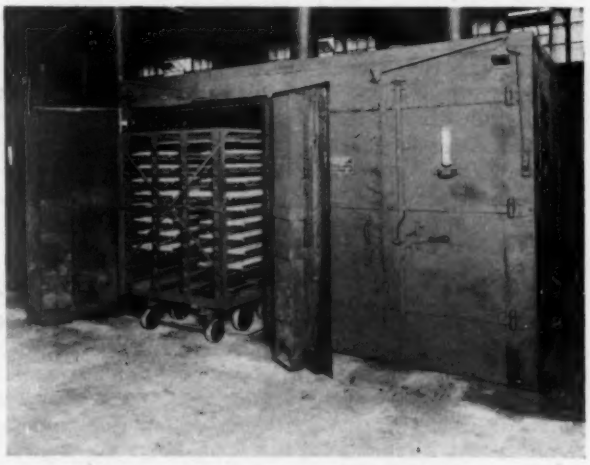
There has been practically no maintenance or repairs necessary in the four years that the oldest ovens have been in use. Another factor in favor of gas fuel is the fine working conditions resulting. In this oven department there is neither dirt nor fumes, since the ovens are well vented thru a high roof. The management also recognizes and appreciates the fact that with these gas ovens, the oven operator can almost forget his source of heat and have all his time to devote to loading and unloading the ovens. These eight ovens are operated with a minimum of labor, especially during the night shift.

Operating Schedule's Influence

Another factor which encouraged this Company to continue to use gas as their core baking equipment expanded was the schedule under which they purchased their gas. Several years ago, with a monthly consumption of one million cubic feet they paid a rate of about sixty cents per thousand. As they grew they secured their second million cubic feet at approximately fifty cents per thousand. Now that they use about two and a half million cubic feet per month, they secure the first two millions at these two rates and the last half million at the very low rate of approximately forty-five cents. With their very fine load factor they are a very desirable gas customer and deserve consideration such as is given by the described rate schedule.

Another reason why this company feels safe in continuing to use these ovens is because they know that the Industrial Gas Engineers investigated other types of core baking ovens and concluded that considering the number of cores baked, the ratio of metal weight to core weight, and the low investment in the present ovens, they could not justify a change to some of the new type ovens used extensively in other industries.

In considering the whole field of core baking equipment they began with the tray and shelf or rack ovens. These ovens are very similar in size and type to the shelf oven used for bread and cake baking. They are adaptable to baking a relatively small number of small cores. The labor costs are high in proportion to the weight of cores baked. Obviously this type of oven is not suitable for baking the large cores produced in such great numbers in a large radiator manufacturing plant.



Core Oven Showing Core Truck

The next type of oven to be considered would be the truck type, heated by a number of bar burners. This of course is the type now used. It is interesting to note that some of the largest manufacturing companies in this country such as the International Harvester Company, the Crane Company, the Dodge Bros. Company and the American Radiator Company, use this type of

oven, either with or without continuous ovens in addition.

Of recent years some of the truck ovens of this type have had their combustion systems changed in order to utilize external heater units. In such cases the bar burners are withdrawn and an external heater unit consisting of motor driven fan and combustion chamber connected such that the fan forces burnt gases and the desired quantity of heated air into oven. If desired the recirculation system is used, in which case part of exhaust products from the oven is forced out of the stack, and the rest is mixed with fresh products from the circulating fan. This system gives ordinarily a high thermal efficiency, and very even heat distribution. In cases where the gas application with bar burners is not very good, this system will show vast improvements. The natural saving in fuel will be lost, however, if the ovens are not tight, since if they are not so, the leakage, due to the ovens being under pressure, will be quite high. If the old ovens are in good condition, and give satisfactory heat distribution it is difficult to justify the cost of installing the circulating system as this cost will be high in proportion to oven investment. Probably this system will be much more extensively used in the near future in connection with new ovens in which automatic temperature control and very even heat distribution are desired. The Brown & Sharpe Co. of Providence has such an installation of new ovens with fan circulating system.

After due consideration the Republic Radiator Corporation was not interested in converting their ovens because they thought their core quality could not be improved upon.

The Continuous Oven Type

Another type of core oven is the continuous oven heated by an external heater. The Studebaker (Automobile) Corporation has an installation consisting primarily of a Monorail conveyor on which the cores are conveyed in racks thru a four pass two-compartment continuous oven each compartment being 120 by 12 by 7 feet. The heat is supplied by an induced draft heater with a fan taking hot air and gases from an external heating chamber and supplying them at the desired points in the oven compartments. The hot air is centralized and exhausted towards the entering end of the oven, thus giving very high thermal efficiencies. In addition there is recirculation of air from the exit end of the oven. Automatic control is adapted to this type of oven with very great success. The cores are very uniformly baked and of good color. There are a number of ovens of a similar type in the Buffalo plant of the American Radiator Corporation.

Another type of continuous core baking oven utilizes a large number of individual gas burners, applied in the drying chamber of the oven. Recently there were five ovens of this type in the Dodge Bros. plant each of which is 100 by 10 by 12½ feet, and is heated by forty burners. The International Harvester Company and the Packard Motor Company have large ovens of this same general type.

These continuous core baking ovens are ideal from the viewpoint of low labor and gas cost and high quality of product, if the production of cores is sufficiently high. The continuous ovens mentioned above have productions of from 3 to 5 tons of baked core per hour, whereas the test showed the Republic Radiator Corporation to be baking only about one ton per hour. Under the latter conditions the cost of the continuous oven was not justified by savings in fuel and labor. The space required for a continuous oven of one ton capacity is very much too great, and entirely out of proportion to that required for the larger sizes. This Company feels that they are using the gas equipment most suited to their needs, and that they are obtaining the highest quality cores at minimum cost when using Industrial Gas.

Foresees Good Future for Gas Industry

FORESEEING a bright future and continued expansion for the gas industry during 1930, O. R. Seagraves, president of the United Gas Company of Houston, Tex., gave a lengthy interview on his opinions which was published in one of the Houston papers recently. Mr. Seagraves' remarks were as follows:

"Ten years ago the natural gas industry virtually was localized in the regions surrounding the Ohio Valley," Mr. Seagraves said. "Today it has progressed to a leading position among public utilities in most of the important sections of the country, in many of which it had displaced or is affording increased competition to artificial gas.

"The development since the war of vast natural gas fields in the Southwest, principally in Texas, Oklahoma and Louisiana, has caused the production of natural gas to increase considerably faster than artificial gas. Based on best present estimates, gross revenues of natural gas companies for 1929 will exceed $400,000,000 compared with $196,000,000 in 1920, an increase of 104 per cent for the 10 years.

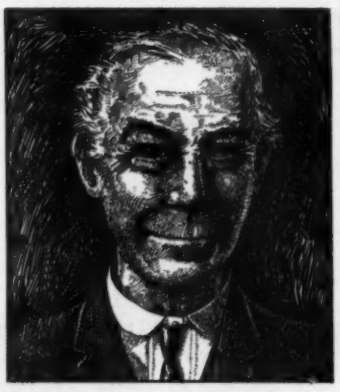
"For the same period sales of manufactured gas will show an estimated increase from $333,000,000 to $550,000,000, or 65 per cent for the 10 years. Natural gas production has doubled within the past six years, increasing from 762,000,000,000, cubic feet in 1922 to 1,568,000,000,000 cubic feet. Last year's production of artificial gas amounted to slightly less than one-third of the latter volume.

"Construction of large pressure pipe lines for transporting natural gas to distant markets has been the principal cause for the recent growth of the industry. The past year has probably witnessed more of this expansion than any other previous year, with the completion of major pipe lines to St. Louis, Kansas City, Memphis, New Orleans, San Antonio, Monterrey, Mexico, Salt Lake City, Ogden, San Francisco and Oakland.

"In the year at hand this expansion is scheduled to continue at about the same rate. It is expected that a minimum of $250,000,000 will be expended for new development in 1930, increasing the total investment in the natural gas industry to $2,150,000,000. New lines to be completed during the next twelve months are those projected to Atlanta, Birmingham, San Francisco, San Diego, and a number of other points.

"Natural gas sales of 1,750,000,000,000 cubic feet or more are indicated in 1930. The United Gas Company and its 27 controlled subsidiaries should secure its full share of this increase. They will furnish a substantial part of the gas required for the new lines to St. Louis, Birmingham and Atlanta, and the entire requirements for the line to Monterrey, Mexico, just completed. These new markets, together, with increased demand through its 3200 miles of controlled pipe lines, should mean an increase of approximately 60,000,000 cubic feet a day to United Gas Company sales."

Letters from a Gas House Terrier to His Grandson



Dear Sam:

Back when I was a cub in the gas business, more things than the modern lack of moustache cups was different. Where they entertained company f'rinstance. Then when a friend or relative rid up without no outward evidence of whether they'd come to spend the day or the summer, there was a bustlin' about to open up the parlor, spread newspapers over the place on its carpet where the sun shone on them rare occasions when it got a chance, and a hurried openin' of the album on the center table opposite the visitin' one's tin-type.

But nowadays a parlor's passay. The big idee is to rush the visitor back an' show 'em the new kitchen.

An', Sam, if you've been around the display rooms of one of these big gas companies lately, I don't have to tell you why. With one glarin' exception I'm goin' to mention, ain't nobody done a better job of goin' decorative than they. Why, old as I am, I revived chilblains last winter that had been dormant for thirty year', just standin' around in the snow on Michigan Avenue in Chicago a-lookin' hungrily in the windows of the gas company there where they had a model modern kitchen set up.

For nowadays, for color and beauty you don't show folks your flower garden, you show 'em your new gas range! And if you hear of earthquakes in Asia, don't believe it: the disturbance is just old King Solomon a-spinnin' jealously in his grave over the colorful glories of one of these up-to-date all gas kitchens.

All of which sort of leads up to the fact that I stopped in to see your Ma yesterday. And got reminded all over again that there ain't nothin' dumber than a smart man that ain't smart enough to know that there's times when he'd do better if he'd listen to the women-folks. And that's when he's in their domain.

Well, your Ma was right glad to see me. But at the same time she had that look on her face that used to result in your Pa's taking his shoes off outside when he come home late, and not usin' the family entrance until things kind of quieted down more around the old homestead. You see, she'd just finished fixin' up one of these kitchens like I been writin' you about— and she wa'n't satisfied.

It bein' too late to duck, I kind of hung around an' agreed with her till I got her drift. And then, dogged if I didn't see her point!

She'd done put a lot of time and money into that kitchen. The

curtains was kind of blowin' in the soft Spring air, and the gas range an' refriggyator an' hot-water tank an' all was one glorious harmony of two-tone' green an' white. An' I was just fixin' to hustle back home an' put on a necktie so I'd do my bit too, harmonizin' with the sweet symphony of color she'd worked out--when I seen somethin' that made me take off my coat an' shoes, put my sock feet up on the table, an' look around for the box of sawdust to spit in!

Some smart young gas man that was paid to think hadn't thunk--that was all! An' I seen why your Ma was madder'n a dispossessed hornet with erysipelas. Would you b'lieve it, Sam, everything in that kitchen was as nice an' pretty an' decorative as a new automobile--until the gas company had come to connect it up! But from that point on the interior decoratin' was by a couple of rude but worthy pipe-fitters with idees imported direct from the junk yards of Secaucus, New Jersey.

Them boys, with a keen sense of the fitness of things and the price of pipe, had connected up that three-hundred dollar dream of a stove with a mess of half-rusty black iron pipe that stuck out in the harmony of that room like a paid singer in a volunteer choir. An', not content with mayhem, they'd added murder by runnin' it from the stove manifold bar down to the floor, instead of plungin' straight back into the wall with it--exposin' thereby only inches instead of feet of its yellin' ugliness.

You see, this is a decorative age. An' if it takes bein' decorative to sell more gas, you want to go the whole hog in bein' decorative. Don't stop an' gag over a few feet of pipe.

An' right there I remembered somethin' I'd heard, Sam--that the difference between a good man an' a great one was often just about two per cent. And in this case the missin' two per cent was in not thinkin' the decorative idea all the way through to the logical conclusion of usin' a length of, say, nickel-plated shiny pipe, to add to--instead of take from--the beauty of that stove. Not to speak of not concealin' the pipin' at every opportunity.

Even twenty year' ago there wouldn't 've been much sense in what I'm writin' here, maybe. But gas is gettin' fashionable now an' the boys have just naturally got to spruce up. I don't mean puttin' frock coats on the meter readers, but just not ever losin' a chance to do a bang-up job in a workmanlike way. An' always keepin' a' eye open for what's goin' on in other lines that you might borrer from. It's a wise man that's got guts enough to pick up a good idee that'll keep him abreast of the times, no matter who practised it first.

A good gas man can learn a lot yet that'll make him welcome in the home when he comes to a halt before a woman's gate an' commences unloadin' what the average housewife still looks on as a truckload of patented devices, for messin' up her house.

By the way, you might check up on what your own company is doin' about this ugly exposed pipin' your Ma was so hot about.

Of course it's a little thing. But any time you are tempted to laugh off the bigness of little things just rickollect the pinch o' sand in your last mess of spinach. An' quit laughin!

Yours for more interior decoratin' in the pipe-fittin' department,

Monoxide Mike

VII—Gas Range Accessories

PERHAPS the oldest range control is the oven thermostat or heat regulator. Its purpose is to maintain a constant temperature in the oven and its overall value is determined solely by comparing the results obtained with and without it. This comparison is almost unnecessary because of the almost universal use of regulators on the modern gas range. The regulator produces better quality food. That alone is the best reason for its use. Holding the temperature of the oven within close limits allows the food to absorb heat at the same rate throughout the whole mass, so that it cooks uniformly in all parts. With manual oven control, many influences can enter to change the flow of gas to the oven burner. A fluctuating temperature alternately cooks too fast and too slow so that a definite final product cannot be guaranteed. The outside of a roast cooked in this way will most probably be very misleading as to conditions inside the meat.

The oven regulator saves gas by keeping a close control on the temperature of the oven. In the initial heating of the oven the regulator permits the temperature to rise only to the dial setting and then closes down the gas flow to a rate which will just maintain and hold this point. This creates in the oven a temperature condition which always uses only the minimum quantity of gas needed for the cooking to be done.

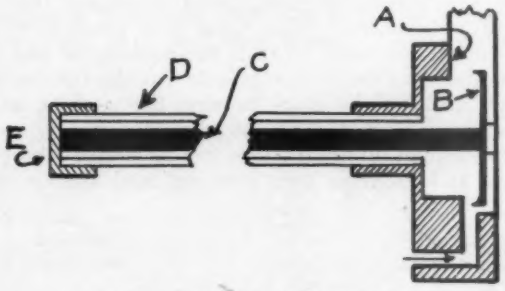


Fig. 1—Principle of Thermostat

The oven regulator saves labor and instills confidence in the cook. Whenever the regulator is set to maintain a definite temperature, the desired points will always result. There is no need, then, for the cook to adjust and fuss with the burners. The food which is cooking takes up the heat at a uniform speed as long as the temperature is constant. It is simple to make use of this speed and cook by the kitchen clock and thermostat. The results will always be the same. After one or two oven meals have been prepared, using the regulator, the cook will have such confidence in her ability and enthusiasm that the continued use is assured.

The oven regulator makes whole meal cooking a success. At one and the same time an entire meal can be prepared in a thermostatically controlled oven. While the meat is roasting, soups and cereals can be boiled, vegetables cooked and desserts made all in the same oven. After the roast has seared to close the outside cells and keep in the juices the other dishes are loaded in the oven and the cooking continued at a low temperature (250°—275°F.) until the whole meal is finished.

Principles of Thermostat Operations

Two parts only are necessary for the opening or closing of a valve by change in temperature. The first is an ordinary valve seat and plunger. The second is some method of moving either the seat or plunger as the temperature changes. One of the simplest ways of doing this is by the difference in expansion of two substances held together at one end and free to move at the other.

Consider the line drawings of Fig. 1.

A is the valve seat.

B is the valve plunger, rigidly fixed to rod C, which is one of the two rods making up the expansion element.

D is a cylindrical rod, rigidly fixed to the valve body.

E is the point at which C and D are joined.

The expansion element (C and D) is exposed to the heat. These two rods are of different materials so that they change length differently, one expanding to a greater extent than the other. Consequently A and B being fixed to the simple moving parts become nearer or further apart in accordance with the changes in temperature. In this way the valve opens or closes to agree with the temperature.

Thermostat Construction

Although a thermostat made in accordance with this design would operate and control temperatures well, many modifications are needed from the manufacturing standpoint to produce interchangeable, perfectly functioning controls.

In practice, the cylinder is firmly fixed to the valve body which carries the seat. The rod, however, merely presses against the valve plunger or a lever which moves this plunger. A spring works against the action of the rod, so that a positive force is available to either open or close the valve. The action of the commercial valve can perhaps be best visualized by tracing the gas flow through a control.

In order to more thoroughly understand the operation of the thermostat, the accompanying sketch, Fig. 2 shows, in simplified form, the essential parts of a heat control and how it regulates the gas supply to the oven burner to maintain any desired baking temperature within the scope of the dial.

The gas inlet to the control is through the oven gas

cock, the inlet nipple, to the inlet riser. The riser pipe conveys the gas up to the control where it enters the control as indicated by the arrows. The gas then flows under the control valve (c) and out of the control to the other riser pipe which conveys the gas down to the point at which it enters the oven burner. The gas will continue to flow through this course as long as the gas cock and control valve are open.

When the gas is lighted at the burner, the oven temperature begins to rise, causing the outer tube (usually copper) to expand, or elongate. Inside of the copper tube is a non-expanding rod of porcelain, carbon or metal, on which the valve (c) rests. Back of the valve is a conical shaped spring which would close the valve were the rod removed.

As the copper tube expands, the rod, which does not expand, is allowed to move further into the control. Due to the pressure of the spring back of the valve, the valve follows the rod, approaching the ledge-like valve seat (E) beneath it, thus reducing the gas supply until only sufficient gas is passed through the valve to maintain the temperature for which the dial is set. This position of the valve is shown in Fig. 2, which also shows the copper tube expanded.

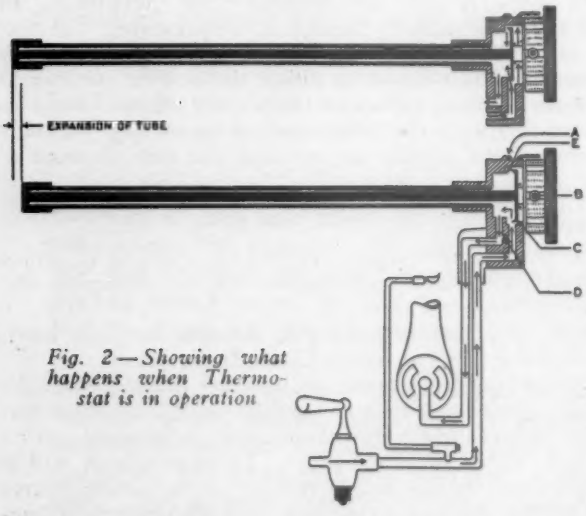


Fig. 2—Showing what happens when Thermostat is in operation

When a low temperature is desired, the opening between the valve (C) and the valve seat (E) is very small, requiring only a small expansion and thus a small temperature increase, to reduce the gas flow. As higher temperatures are wanted the valve opening is increased, requiring more expansion.

It follows that if, in the operation of the control, the valve should be completely closed, the oven burner would go out. To supply enough gas to keep the burner lighted when the valve is closed, there is incorporated an adjustable by-pass valve (D) into which is placed a tapered adjusting screw. This should only supply sufficient gas to keep the burner lighted, and not more than required to maintain 250° in the oven.

There is also provided a pilot light which ignites the burner and is ignited by the burner. This should burn only when the gas cock is turned on and is purely a safety accessory, having no effect on control operation.

The change in the distance between the valve plunger and the seat is accomplished by a manually operated dial, marked with temperatures and the type of oven cooking done at those temperatures.

Instead of a direct action of the valve plunger, some controls use a lever to multiply the slight changes of length into sufficient movement to open the valve wide enough to pass the required gas.

Figs. 3, 4 and 5 show the interior construction of some of the more popular regulators.

Time and Temperature Cooking

Different samples of meats, dough, and other uncooked foods are sufficiently alike so that one pound of any will take up heat and cook in the same time as another pound of the same substance. The cooking speeds have been accurately determined for each of the various substances so that all that is needed for com-

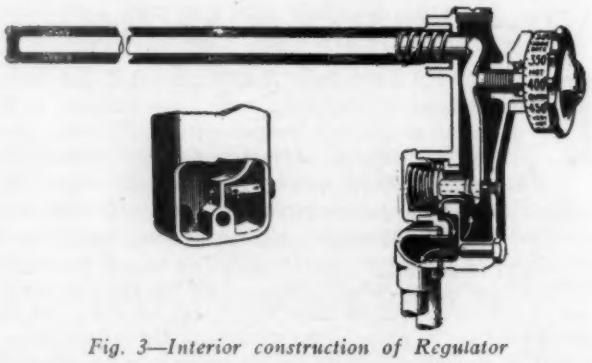


Fig. 3—Interior construction of Regulator

plete freedom from supervising the cooking is to set the regulator and watch the clock. For roasting or baking, the time per pound varies among meats. The more delicate, such as fish, require the lowest temperatures and shortest time; poultry, being a trifle coarser, must cook proportionately longer and so on to the meats of the coarsest fiber, and with the greatest fat contents.

Time and temperature cooking is no longer a guess and gamble, but absolutely positive and satisfactory. The greatest danger is in miscalculating the time, but the careful cook will occasionally note the progress and will quickly detect any tendency to overcook.

Successful manual time control and automatic temperature cooking has been reflected in the past few years in the development of completely automatic time and temperature devices. With these it is possible to load the oven, set the clock to start the cooking at any convenient time, set the heat regulator for the correct temperature and set the clock to stop the cooking at the proper time. Such devices are gradually gaining acceptance and should find ready sale among people who go to business and do their own cooking, and among those

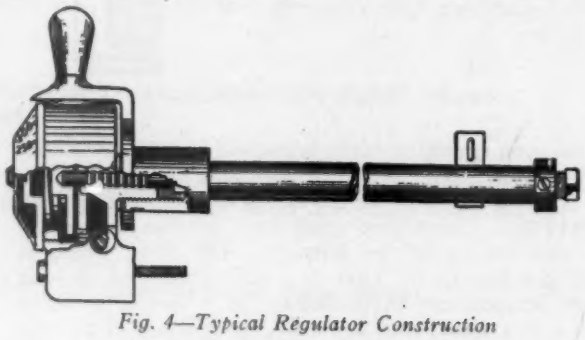


Fig. 4—Typical Regulator Construction

whose afternoon social engagements are many. The home with maids will also find such appliances of great value because of the elimination of most of the cooking supervision and the certain knowledge that at the exact

time, cooking will cease. The type of control usually used for this purpose operates in conjunction with the oven regulator. The lighting pilot of the regulated stove becomes a standing pilot. A small gas line is taken off between the regulator valve and the gas way to the

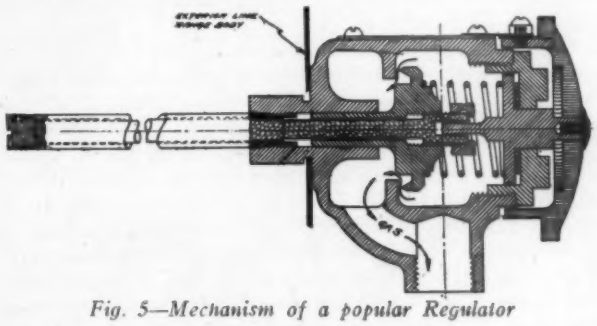


Fig. 5—Mechanism of a popular Regulator

oven burner. This line goes to the clock valve and then to the time pilot adjacent to the standing pilot. The flame of this time pilot when the clock valve is open, heats an expansion element which allows gas to pass only so long as the time pilot is burning. The clock controlling this pilot therefore positively operates the oven. A diagrammatic sketch, Fig. 6 shows the time temperature control.

One type of clock and the application of this control to a range are shown in Figs. 7 and 8. The numbers on the dial indicate the hours. The time of setting is at the arrow. The ON hand is set at the desired time for starting and the OFF hand when cooking is to be stopped. In the cut, Fig. 7, the clock was set at 9:15, cooking is to start at 3:45 and stop at 6:15. The small take-offs to the clock valve can be clearly seen (Fig. 8) extending from front to rear of the cooking top, just above the mixing tube. The pilot valve is just below the mixing tube and is controlled by the heat of the time pilot.

A different type of heavily insulated gas range for time-temperature cooking is provided complete with thermostatic device controlling gas flow and flue damper. The principle involved in this range is cooking on a falling temperature by the heat contained in the food, pans and oven linings. The cooking starts

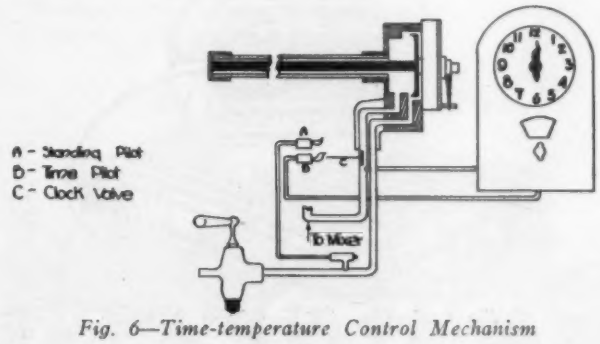


Fig. 6—Time-temperature Control Mechanism

in the same manner as on the usual range with one exception. Instead of the dial of the thermostat indicating a fixed temperature, the indicator is set for the weight and kind of food being cooked. The heat liberated by the gas flame tends to raise the temperature as in all ranges. The material being cooked, however, by absorbing heat, makes the temperature rise slower than in an empty oven. The weight of the food also has a great influence on the rate of temperature rise; the heavier the load, the slower the increase. By proper calibration of the thermostatic device the temperature finally reaches a point where the cooking will be finished by the heat absorbed. At this point, the device closes the gas valve completely, at the same time shutting off all flues. Because of the heavy insulation and impossibility of air circulation, the drop in temperature is very slow, with the roasting continuing at constantly slower speed. As the temperature before the regulator closes is quite high, the surface of the meat is sealed. The interior of the roast is cooked therefor to a degree determined by the heat absorbed during heating up and the period of cooking.

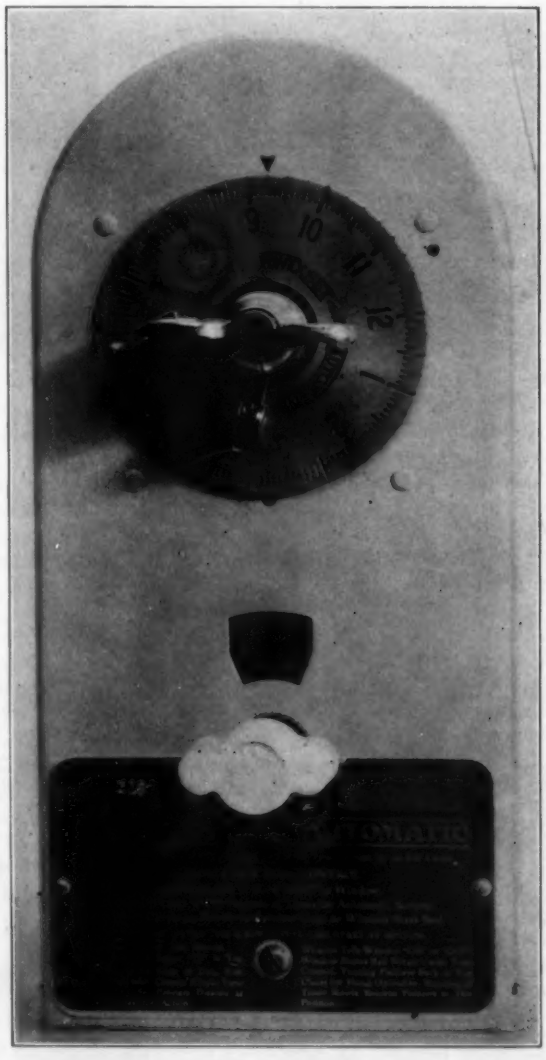


Fig. 7—Setting of Time-temperature Control

The higher initial cooking temperature requires more fuel for the heating period which is compensated by the fuel saved during the time that the cooking is continuing from the absorbed heat of the contents.

Too much cannot be said for equipment of this kind, as it is one of the more important steps in the modernization of the gas range.

Since Mrs. Noah used the first range in the Ark, oven racks have changed in design but not in principle. A few years ago a new type rack was devised which prevents the oven shelves from being pulled out. The

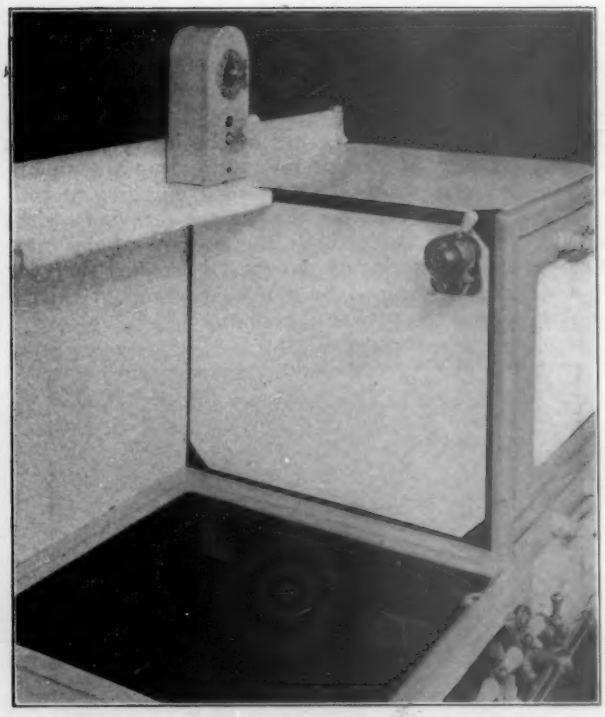


Fig. 8—Location of Time-temperature Control on Range

shelves are provided with a stop that keeps the shelf on the guides even though a heavy roast is carried on the shelves. A spring wire handle which is attached to the shelves as needed eliminates the use of pads in drawing out oven racks. The construction and application of these racks which are firmly fixed to the linings are shown in Fig. 9. The same device is used in the broiler.

A broiler pan which pulls out when the broiler door opens, aims to do the same as the safety racks described above. As the door opens, the teeth of a gear quadrant engage a toothed rack on the broiler pan which forces it forward.

A handle on the outside of a broiling oven raises or lowers the adjustable broiler pan without opening the door, pulling out the pan and putting it back on another guide.

The value of these accessories is almost self evident, but by making accidental oven burns impossible, the safety racks should find wide application.

Oven thermometers for aid in manual oven controls are serviceable where ranges are not equipped with regulators. These may be of mercury filled glass or a bimetallic strip instrument which controls a pointer. The mass of this type holds the temperature for some time so that much more reliable readings are possible without using the extreme care necessary in reading the mercury thermometers.

Top Burner Accessories

The lighter was the earliest and the most widely used range accessory. Its convenience, simplicity and reliability made it of the greatest utility. It eliminates the need of matches with the ever present fire hazard and the possibility of matches falling in the cooking.

Lighters now are undergoing revolutionary changes. The familiar push button and flash will gradually be displaced by the igniter which lights the burner almost as soon as the cock is opened. In addition, the igniter will always be ready to relight the burners which have been blown out or smothered because of pots boiling over. Such a lighter consists of the familiar small flame used so satisfactorily on the push button type, enclosed in a housing similar to the present hood, and leading to each of the burners by a baffle. The same flame size is used.

The operation of these lighters is based on a simple property of gas burning. If a mixture of gas and air contains too much air to burn satisfactorily, it flashes back to the point at which the gas and air issues from a port. When the gas cock is turned on the first air-gas mixture of the burner flows into the ignition channel which is filled with air. This creates a mixture of air and gas almost infinitesimal in amount, too lean to burn steadily. It ignites from the lighter flame and flashes back to the port from which the mixture came, thus igniting the entire burner. With a stove equipped with these lighters, it is possible to turn on each gas cock in succession and have each burner lighted before the next cock is turned on.

Development work is continuing to make this lighter an absolute safeguard on top burner operation. This will be accomplished by the use of a thermostatic valve which permits gas to flow to the burners only so long as the pilot is in operation. Preliminary models of this type have been in operation for some time to determine the desirability, not only from the laboratory standpoint, but also from the actual service expected from such a device under normal cooking conditions. The transition from a convenience lighter to an absolute safeguard against suicides and accidental asphyxiations will be one of the foremost developments in gas range accessories.

Low Consumption Burners

The greatest waste of gas in the range is caused by poor attention to top burner cooking, particularly when boiling is carried on. Some accurate investigations have shown that the gas consumption to maintain the contents of a vessel at the boiling point for one hour is between 18 and 26% of the amount needed to bring the contents to a boil. It can be seen that a waste of

Fig. 9—Improved Range Oven Rack

between 75 and 80% of the fuel used is possible, although the attention given probably results in a fuel loss of between 30 and 50%. To eliminate this loss and to make better use of the limited space available in the modern apartment dwelling, two distinct designs of top burner controls have been perfected. One of these combines the simmer burner with the regular or giant burner. These two rate burners give the advan-

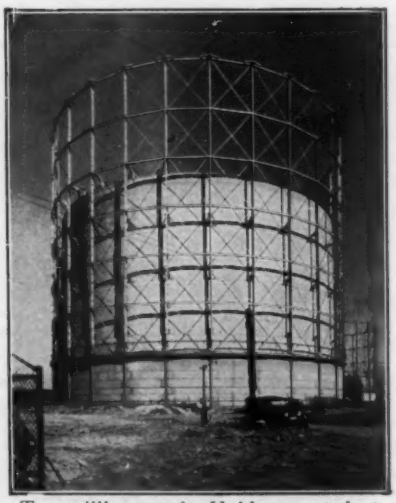
(*Continued on page 67*)

ABILITY TO SERVE

THE WORLD IS OUR FIELD

ABILITY TO SERVE

The Value of Reputation

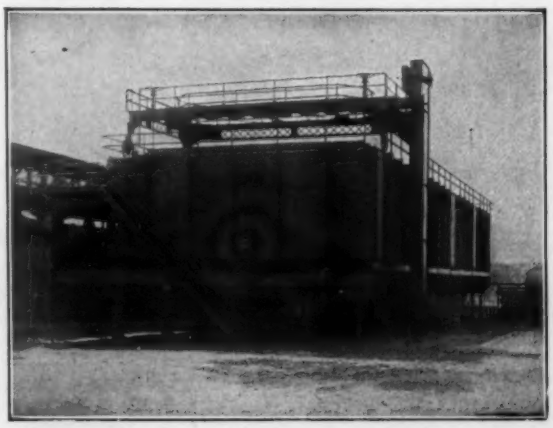


Ten million cu. ft. Holder erected at Buffalo, N. Y.

Reputation gained through some extraordinary accomplishment is ineradically stamped on the mind.

It was our reputation for "extraordinary accomplishment" in fabricating and erecting the Ten Million cubic foot Gas Holder, at Buffalo, N. Y.,—completing it months before the specified date—that brought us the order for Holders of a similar capacity at Long Beach and San Francisco, California, and of lesser capacities elsewhere,—also completed ahead of time.

Stacey Brothers Purifiers reduce cost of operation and maintenance



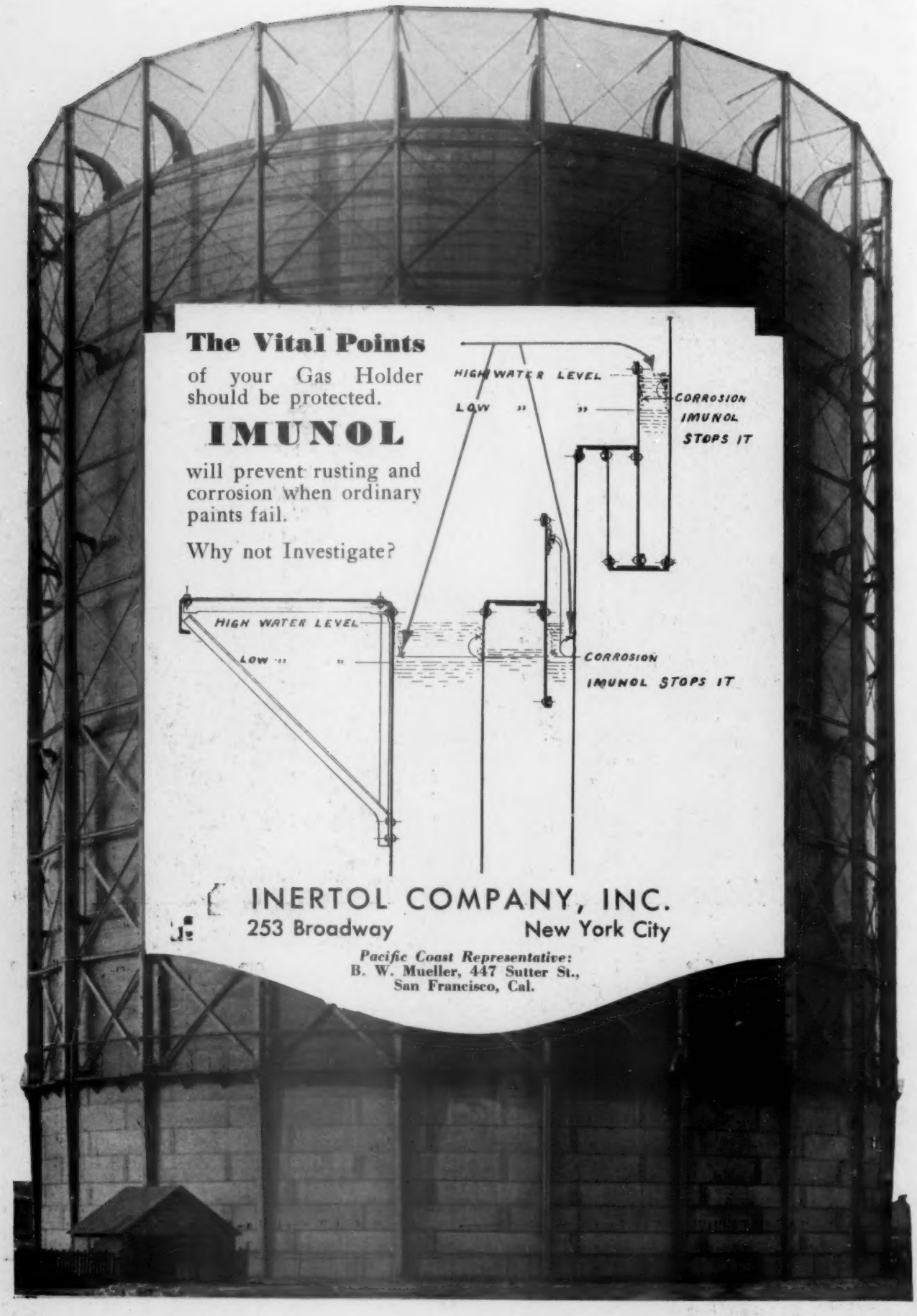
The Gas Industry long ago learned that our "Ability to Serve" meant something more than three words and has confidence in us, as the "Pioneer Gas Holder Builders of America," to bring to a successful conclusion any project we undertake in either Low or High Pressure Holders, Purifier Boxes or our other products. You can repose fullest confidence in our

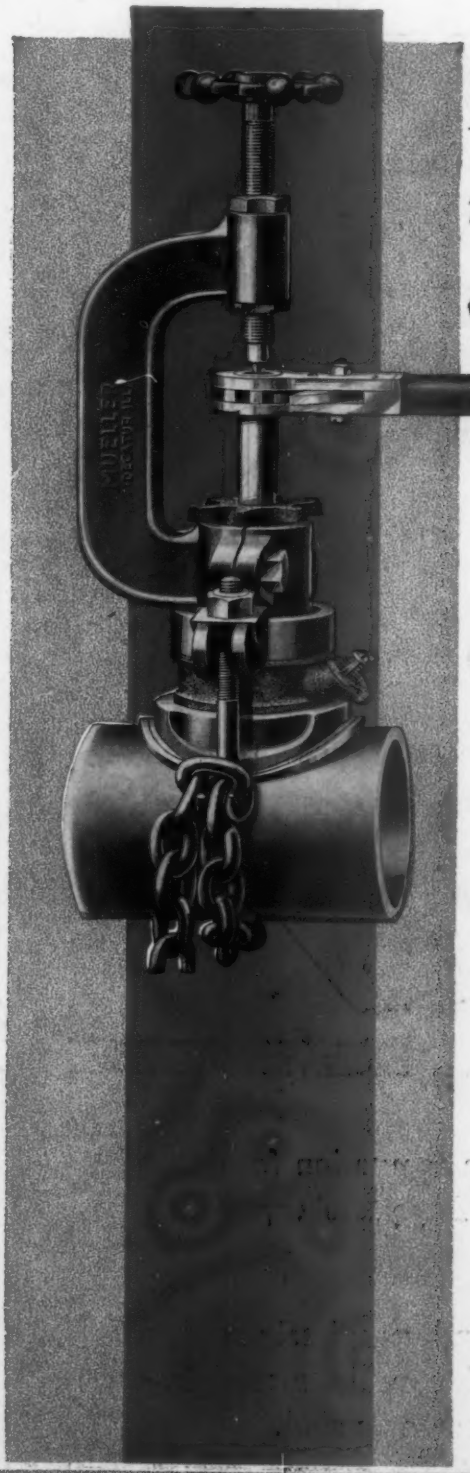
"Ability to Serve"

The STACEY BROTHERS Gas Construction Co.

CINCINNATI - OHIO

NEW YORK OFFICE—75 West Street — New England Representative—Eastern Service Co., Boston


The Vital Points
of your Gas Holder should be protected.
IMUNOL
will prevent rusting and corrosion when ordinary paints fail.
Why not Investigate?
HIGH WATER LEVEL
LOW " "
CORROSION
IMUNOL
STOPS IT
HIGH WATER LEVEL
LOW " "
CORROSION
IMUNOL STOPS IT
INERTOL COMPANY, INC.
253 Broadway New York City
Pacific Coast Representative:
B. W. Mueller, 447 Sutter St.,
San Francisco, Cal.



MUELLER design *means "an extra margin of satisfactory service"*

Made to work on the pipe from any angle, Mueller Gas Tapping Machines are designed to give the utmost in results with a minimum of physical effort. The "L" Tapping Machine illustrated is for use on mains 3/8" to 2" inclusive, under pressure.

Because of Mueller's association with this phase of gas utilities since the early beginnings of the industry, Mueller Tapping and Drilling machines are exceptionally well fitted to the conditions under which they must always be used. The intimate knowledge that such close contact with practical every day problems has given Mueller designers and workmen is your assurance of *an extra margin of satisfactory service* when you purchase Mueller equipment.

Mueller Co., *(Established 1857)*, Decatur, Illinois. *Branches:* New York, Dallas, Atlanta, San Francisco, Los Angeles. *Canadian Factory:* Mueller, Limited, Sarnia.

MUELLER

A request will bring complete information on the full line of Mueller gas supplies—

Cleveland Gas Meters have a reputation for dependable service, the result of over thirty years' experience in manufacturing.

Our thoroughly organized and completely equipped factory assure you that the workmanship, materials, accuracy and general efficiency are unequaled.

"A" Type Meters "B" Type Meters

THE CLEVELAND GAS METER COMPANY

2168-2180 East 65th Street Cleveland, Ohio

Gas Range Accessories

(*Conotinued from Page 62*)

tage of speedy heating up and low turn down. When a cooking vessel has reached the boiling point the gas cock is turned down part way in some models until the cock closes and the regular or giant flame is shut off. The simmering flame still continues to burn at its normal rate. Laboratory experiments show that the consumption of this burner is sufficient to keep the contents of the vessel boiling without the addition of any further heat. The advantage of this double burner is in the fuel saving which result.

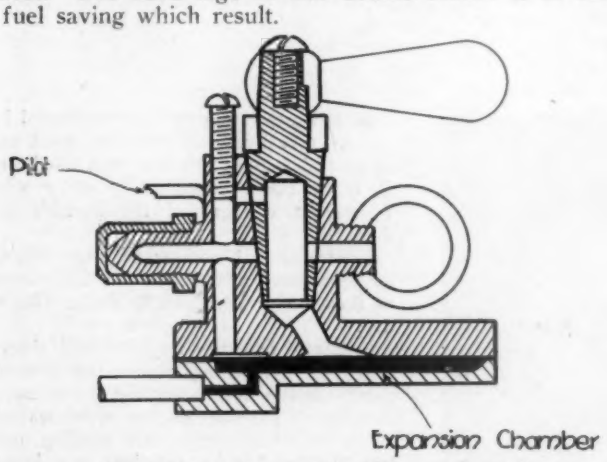


Fig. 10—Low Consumption Burner Control

This type of burner has been further modified for automatic control. Figure 10 shows a cross section of this control. Steam is led from the side of the cooking vessel, which may be a pot, double boiler, or similar vessel, to a bulb containing a vapor. The temperature of the steam causes the vapor to expand, which reacts on a metal diaphragm, automatically turning down the flow of gas to the burner orifices. In this control the cooking controls itself, for if the boiling ceases, the liquid in the valve contracts and allows the

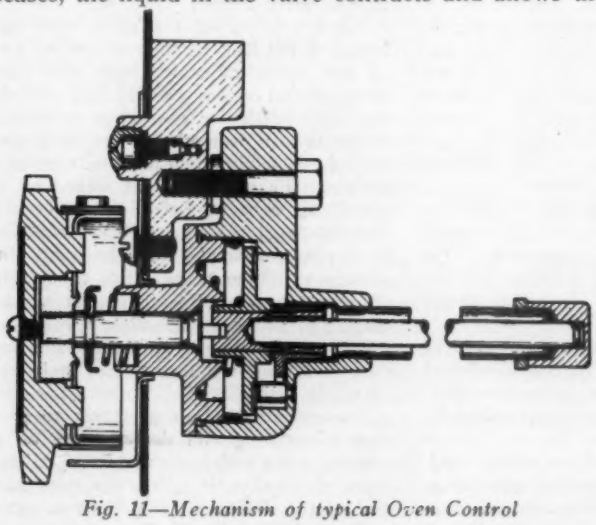


Fig. 11—Mechanism of typical Oven Control

valve to open up to a point so that the boiling will continue at its definite rate at all times.

A control of this kind acts as a safeguard. It is impossible for the vessel to boil over and extinguish the flame.. A control of this kind makes it possible to use the cheaper cuts of meat and still prepare delicious foods. It provides a simmer burner and regular burner combination in the space ordinarily used by the regular burner alone.

For the past few years the problem of accidental turning on of gas cocks has received a great deal of attention with the result that many, many self-latching gas cocks have been designed. The function of these gas cocks is to impose a restraint on the opening of the gas cock. In all types it is necessary to perform an addition physical action before the gas cock can be opened. Even to catalog the number of different types would require a great deal of space. They can, however, roughly be divided into devices which have been added to the standard gas cock, and the built-in self-latching device. On the standard gas cocks, hoods have been

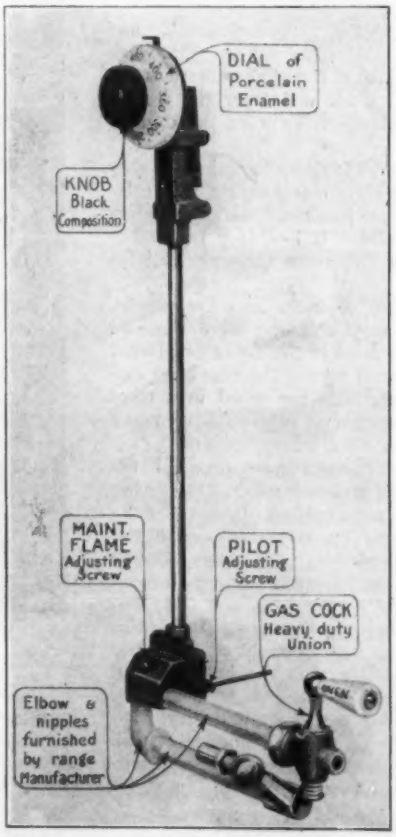

DIAL of Porcelain Enamel
KNOB Black Composition
MAINT. FLAME Adjusting Screw
PILOT Adjusting Screw
GAS COCK Heavy duty Union
Elbow & nipples furnished by range Manufacturer

Fig. 12—Assemblage of a Popular Oven Control

used, notched, so that when the burner was turned off it is held in position by the latching action of the handle of the cock and connections of the cock body. Another type consists of a trigger-like arrangement which is clamped on the burner manifold. Self-latching cocks have latches which must be released by pushing or lifting.

The self-latching cock has proved satisfactory and not burdensome to the cook. It is probable that in the course of development the thermostatically controlled top burner lighter will eliminate the necessity for self-latching cocks because of the greater degree of safety. With the thermostatic pilot controlled lighter, if a burner is smothered, blown out or the cock accidentally turned on, the pilot will immediatey light the burner. On the other hand, if the pilot flame is extinguished, the gas flow to the burners is stopped. In this way complete safety is achieved.

(*Continued in April issue*)

Head-lines and Merchandise Sales

WILLIAM H. MATLACK

HEAD-LINES, "grape-vines" and lunch table talks indicate that business having found that there is joy and profit in work will enter the second quarter of nineteen-thirty on the up-i-ty-up.

Buyers are looking for bargains and they demand first class merchandise, unit sales of inexpensive items are larger, dollars and cents volume is lower; yet distribution is wider and more folks are satisfying wants.

Conservation is upon us. Cornstocks, which until very recently, were disposed of as fodder, fired in the fields or plowed under, will soon invade the furniture factory as a substitute for wood in a compressed form that is said to have many advantages over the natural product.

Mail order houses have entered the building game and now offer, at a saving of from ten per cent up, plans, construction and home finance. Folks who can produce a deed for a lot may soon be enjoying all the things that go with owning your own home.

The shoe industry is not satisfied, folks do not pound out enough shoe leather and it is possible that the industry will seek ways and means to popularizing walking. Pedestrian clubs will create appetites and help the old domestic load. We're for it and anyhow, there's health in a good daily walk.

Tinted Testimonial

The tinted testimonial is destined to repose on the city dump. Society folks and the movie star may suffer, but who can better afford it, and "Truth in Advertising" MUST Prevail. The demise of this instrument may sadden the saps who solicited signatures but it will gladden the hearts of the masses who could not break into print and who did not believe the half of it, anyhow. Truthful advertising profits everyone. Let's watch gas company advertising very, very closely and put the taboo on comparative prices.

Somewhere we have read that woman, the purchasing agent to the tune of ninety per cent, place very little faith in "horrible sacrifice sales." They have concluded, and wisely, that the man who makes sacrifices stings someone.

Radio manufacturers are going in for electric refrigeration. The tiny gas flame should be the ice man in every home.

William H. Matlack

Polygon gas holders, painted green; the industry just will not be old fogey and the gas man who has settled in a rut may as well make up his mind to it or else get out. The industry is moving fast and has no need or room for excess baggage. There are enough rewards in the industry for all if the individual who seeks them is on the up-i-ty-up.

Plenty of cash and the ability to issue bonds at a low interest rate insure the industry of an unusual construction activity as soon as Jack Frost is out of the ground.

Consolidations, when economies may be effected, will no doubt be continued and many poorly managed properties are likely to be purchased by large, efficiently manned organizations.

Waste is being curbed on every hand. Consolidations in the natural gas industry will further aid the movement during the coming months. Centralization of operation will eliminate duplicate drillings, transmission lines, field and operating organizations, and thus enable the industry to devise more economic rate structures and pass on the savings to the user.

The head lines are made possible, readable and interesting by men motivated by *work*. It really seems that the good old fashioned prescription has been filled and is being taken seriously by many who heretofore disregarded the doctor's orders.

Nostrums and notions of super-selling have vanished in quarters that took them as their daily dose prior to Black Thursday.

Stunts have made way for real showmanship, "everything except the kitchen stove" and a few necessary props have vanished from the display windows of today. Salesmanagers are dishing out less "hokum," sales meetings are being rid of hip-hurrah and quiet orderly business meetings are the order of the day.

"Check and Double Check"

Plans are planned well in advance of a sale, and carry the *check and double check* as to time, place, price, terms, merchandise and method of procedure. Educational activities are being given a break. The salesman is being required to know his stuff and have a full understanding of company policies before he calls upon a single prospect or attempts to sell a single item of merchandise.

Manufacturers who a short time ago bewailed the lack of interest on the part of the dealer in dealer helps and sales plans offered once a year are now scratching their heads for new ideas to satisfy demands for "something new and special" for a semi-annual activity. One sale, campaign or activity is so staged as to permit all concerned—individual dealers, department stores and utility companies in the same vicinity and in many instances throughout the land—to cash-in on such an effort. This entails a vast amount of planning, preliminary work and follow-up, yet it conserves man-power and money such as nothing else can and, best of all, it gets RESULTS, forestalls cut-prices, enables the manufacturer to produce advertising and dealer helps on a quantity basis and lowers costs of selling. Aside from that, it speeds up sales and enables the dealer to offer "known quality," nationally advertised merchandise at a lower price. Advertising may be said to be responsible for it all.

Another thing that is widening the distribution of merchandise and, as the industry becomes accustomed to it, will call for the creation and production of new

appliances, is the concurrent plan of conducting sales. This allocation of specific periods for the sale of such "wanted items" as gas ranges, water-heaters, room heaters and gas refrigerators, will prove to sales management, in short order, that specialization on plans of selling will enable the sales manager to become an active merchandiser on appliances which "people do not buy."

The greatest reason why people "do not buy" is that in ninety per cent of the cases analyzed by this writer they do not know that the appliance exists. Folks have clothes drying problems, garbage disposal problems, cold garages, hot and cold homes, and any amount of other problems that may be solved by the use of gas, but, very few seem to have taken the trouble to tell them so.

Ask the first ten women you encounter, homemanagers, "What do they sell down there at the gas company?" and eight will answer, "stoves and water heaters, and the little room heaters and a contraption that makes ice;" the other two will not know.

What causes that?

Why don't women who have a laundry drying problem fifty-one and one-half times a year purchase a gas heated laundry dryer? Why don't women who dwell in the average city, where garbage collection is not guaranteed, burn their garbage and waste material in a gas incinerator? Why are the radiators on any number of automobiles frozen every time the temperature drops below the freezing point? Why don't their owners protect them by installing a gas fired garage heater? The answer cannot be because the appliances are too expensive, either as to first cost or operating cost. It cannot be that folks enjoy having their automobiles freeze up, or carrying garbage or fussing around trying to get the clothes dry. The reason that these and other needed gas appliances are not in more general use and catalogued as "wanted merchandise" is that folks don't know that they exist.

Head lines and hoof-work will sell these appliances and from what we know of many manufacturers of such appliances they will be tickled pink to co-operate with all who may wish to get these needed items talked about and purchased.

The manufacturer is on the up-i-ty-up; it's the gas man who has worked up a state of mind that has caused some blamed good, needed gas appliances to have an up-hill row to hoe in getting into the "wanted merchandise" class. We often wonder what would have happened to the automobile, the radio, the vacuum sweeper, the health machine, the sun lamp and a lot of other items that are purchased to the tune of millions if they had been left to some folks to sponsor and popularize? It gives us the headache. On the other hand, some of the very items that were "not bought" by folks even a year and a half ago have been popularized here and there and put into the "wanted" class by a few progressive merchandisers who are on the up-i-ty-up—and how!

This Advertising Is *There*

"Turning Points to Comfort," is the head line given a new series of honest-to-goodness human interest advertisements being used by the Consolidated Gas Company and related New York Companies. These advertisements, it may be said, are a new type of testimonial advertising in that they are based on stories told by customers; true stories based on experiences of the far-sighted who have the good judgment to use gas the carefree fuel for home heating. They are good and we know you will read the one reproduced here and that it will get you to thinking about gas as an ideal fuel for home heating.

TURNING POINTS TO COMFORT
This Sportsman said...
"I traded my shovel for a gun"
USE THIS COUPON TODAY
Your home can be
heated with gas!

Of Interest to Appliance Merchandisers

Again *Domestic Commerce* reports a study that should interest the man who sells gas appliances. The study conducted by the Ohio Retail Dry Goods Association lists the following as causes for some of the net losses in retailing:

1—Waste of space—Goods that occupy valuable space must produce sales income to pay the rent of the space.

2—Waste of capital—Goods that stay and stay must be "cleared" to provide space for goods that sell.

3—Waste of sales salaries—Each sales person must sell in proportion to salary received and his sales efforts must be used on profitable merchandise.

4—Waste of advertising—Advertising dollars must be spent to make sales of profitable goods or goods that bring people to the store to buy other goods.

5—Waste of credit—Credit must be extended only to those who deserve it and collections must be made according to the terms granted.

6—Waste of administration — The management of the business must eliminate the waste, misdirected executive effort and focus on the vital problems of merchandising.

It seems that these points may well be checked over by the man responsible for merchandise sales. It is particularly interesting to note that the analysis made by the above association bear out that advertising dollars should be spent to "bring people to the store" by advertising merchandise that does not carry a great profit. Bringing more people into the store is a big problem that the gas man has yet to solve. Anything that will bring folks into the store is well worth undertaking, provided sales people are trained to take care of them after they come in.

Selling high class specialties that cannot be "toted" under the arm calls for very efficient store selling and sales people and for good advertising and window display.

Are We Up with the Procession?

According to Ruudi-ments 7,000,000 bath tubs have been installed in American homes during the past six years. How many gas water heaters have been installed to provide these bath tubs with what they should have in the way of hot water service? That's what we would like to know. We do know that in certain cities the percentage is pretty high; for instance, we understand that the New York Power and Light Company, Albany, sold 2.2 per cent, 785, of their customers hot water service during the first ten months of 1929. Chattanooga, Tennessee and other cities from coast to coast have sold a whopping lot of water heaters, all of which leads us to the opinion that 1930 will be a mighty fine water heater year for those who start in early and push the sale of water heaters throughout the year.

Facts Worth Knowing

Do you know that one-third of the people who purchase electric refrigerators have an income of $200.00 a month or less and that one-half of them are earning less than $250.00 per month?

Do you know that most every family is buying something on the little-by-little payment plan?

Do you know that from $20.00 to $50.00 a month is going out of the average family's pocket-book each month for something that is being paid for on deferred payments?

Do you know that the larger portion of the automobile purchases are made by people who have no *need* for automobiles, and that the sales are made simply because they *want* an automobile?

If you know these things there is no reason why you should not be selling first class gas ranges, storage water heaters, laundry dryers, incinerators and gas refrigerators, except that you have not made folks in your town *want* these *needed* appliances. Remember, most everyone has become accustomed to that "so-much-a-month" expenditure for things they *want;* so get busy devising ways and means of making them *want* the things you know they *need* and which help to build up the domestic meter load.

An Inexpensive Window Display

If you are planning a water heater sale for April here is an idea that you may employ for a window display advertisement. Cut from composition board four figures as illustrated by the accompanying sketch, paint them black and mount them in the center of your window. Use drapes for a background, paint a sales message on a white streamer:

"The Whole Family Want IT" or "Hot Water for the Whole Family," work out a floor scheme of black and white, secure a single window card setting forth terms or whatever you wish to play-up, set a single continuous flow gas water heater on a raised (two inches) black and white platform to the right of the cut-outs and you will have a window that is in tune with the times and that will attract a lot of attention.

Studio Kitchens

And now the kitchens enters the realms of art. According to *Domestic Commerce;* "A studio kitchen designed to render a two-fold service to food manufacturers, advertising agencies, and those particularly interested in food accounts is an advertising innovation reported from the Middle West. The art department is said to render a complete art service, not only on food accounts, but for every type of advertising.

"The kitchen, under the supervision of a home economics expert, is reported to have every facility for the testing of recipes and creation of new uses for all foodstuffs. It is possible for a copy writer for food accounts to have recipes tried out, tested for taste and appearance, and sketched or photographed in the laboratory kitchen."

Such a move should help the manufacturer of foodstuff and tend to eliminate many of the absurd recipes that we have seen published from time to time.

Worth Copying

Time and again we have advocated a little humor and human warmth in our so-called institutional advertising. We have maintained that many otherwise regular gas men become staid or fearful when undertaking to tell of the advantages of gas and gas appliances in advertising. We have said that we might try a bit of humor to enliven interest.

We have cited instances:—Ovington's, Rogers, Peet and Co., McCreery's in the United States and Fortnum and Mason in England—where humor, showing disadvantages, was employed to add strength to many arguments as to the advantages of what they had to sell *would do for you.*

However, while we have seen gas company advertisements that were funny, we have not witnessed any systematic attempt to sell either gas service or gas appliances by the employment of smile copy. Yet it is being done by a company in our sister industry, The Edison Electric Illuminating Company of staid (so it is said to be) old Boston, in fine fashion to sell the home manager the idea of using the special service facilities of its Home Service Division. The advertisements, one of which we are reproducing, use humorous illustrations by the famous John Held, Jr. to depict the theme of an equally bit of humorous copy. Headed in a type face of the "ask dad he knows" period and using words that disarm even the most hostile reader, adding rather than detracting from the conviction of the message—even tho a word is used that would have called for pepper on the tongue a generation ago—these advertisements get over the story of service, to be had in fine fashion.

A Good Tip

April marks the arrival of the early spring crop of brides which grows larger until the peak is reached in June. Now is the time to renew your acquaintance with the records kept on file in the office of the County Clerk.

These records will inform you daily, if you wish, of those who have entered the realms of home management, purchasing agent extraordinary of gas ranges, water heaters, laundry dryers, incinerators and gas refrigerators or what have you for lightening the labors in the home. Watch 'em.

Keeping Tab

Quota boards for salesmen are finding their way into offices of more and more salesmanagers and it is said that one of the reasons for this is that many general managers have greatly concerned themselves with the direct selling cost of appliances. Some it is said have set the dead line at 12 per cent.

It seems that cost will play a part in the 1930 drama and that a great deal of thought will be directed to ways and means of selling only load building appliances, kindred and related appliance sales having gone haywire in many sections.

Down to Brass Tacks

The advertising manager of a large range manufacturing outfit tells us that 1930 promises much in the way of range sales. He says that many of the men who are responsible for range sales will abandon the "sketchy sales plan" this year and will get down to brass tacks with a plan that covers range selling from soup to nuts.

These plans, he intimates, will consider not simply one big hurrah sale but will consider the range business as an activity to be carried on throughout the year. The opening drive which will be undertaken in April and May, depending upon locality, will probably feature, in a new dress, an allowance for old stoves. But such an offer will not be made again until late fall. Other special drives will be conducted about every sixty days.

Protecting the Cooking Load

Quality gas ranges recommended to offset electric ranges and increase sales

RODGER K. TENNEY

North Shore Gas Company

MR. and Mrs. John Henry Public are about to buy a new cooking appliance. Mrs. Public, of course, is the dictator when it comes to the final selection—but Mr. Public is interested, too; not only because he is to pay for the appliance, but because he will be eating whatever is cooked in or on it. Neither one has fully decided which is preferable, and so the balance is about equal between a gas range and an electric range. Although they are now using a gas range, Mrs. Public has heard so much about electric cooking that she has determined to investigate its advantages, if any. She knows gas cooking is satisfactory, for she has used a gas range for many years. But the electric range idea intrigues her, and so off she goes, nibbling at the bait of the gas company's competitor. Mr. Public trails along, if not in person at least in mind. He, too, has heard about electric cooking and while he has always been satisfied with everything his wife has cooked with her gas range, he too, would like to know the whys and wherefores of electric cooking.

Security Passe

This illustrates how insecure the gas company's position has become with regard to the supplying of fuel for cooking. Security in any business is a thing of the past. Individual companies must keep on their proverbial toes to assure continued success. And as the cooking load is still the mainstay of practically every gas company's business, it behooves every company to maintain alert, aggressive sales methods in the promotion of modern gas ranges.

Gas companies in general have realized the necessity for abundant promotional work in the sale of gas ranges. The public mind has been inculcated with the gas cooking idea, but just as no business is secure, no idea is secure nowadays. Continuous effort is vital if gas is to remain the outstanding cooking fuel in American homes. With the class of gas cooking appliances available today, there is no reason why gas companies cannot retain the major portion of the cooking load and increase it yearly to many more millions of feet.

Every gas man knows that the gas range, in its present form, is far and away the best cooking appliance. In the first place, the woman cooking with gas has heat much more quickly than with an electric range; she has a range that can be operated at a great deal less cost, basing comparative costs on average consumption of cubic feet of gas and kilowatt hours of electricity; and she has a range whose durability exceeds that of the electric range. Both gas ranges and electric ranges are equippd with the oven heat control, but this is a strong talking point for a gas range when combined with the other highly desirable qualities of this cooking appliance. The heat control feature should be exploited in every bit of publicity a company gives gas ranges, and this publicity should be extensive if companies wish to hold the cooking load. Oven insulation also should be given a generous share of attention in building gas range sales.

Compelling Thinking

The public mind is a curious collection of different thinking individuals. There are means, however, of compelling unified thinking; that is, making the public "conscious;" aware of interesting facts about your product or service. When the public is made to realize certain things, you become popular, and popularity is the root of success. Gas ranges must be popular and widely used to protect the gas companies' domestic load.

Gas merchandise today is on a par with, or better than, merchandise in other lines. Consider the gas range of a few years ago. No one would dare, from present day standards, at least, term it a thing of beauty. It was solely a utilitarian appliance, without the many desirable features incorporated in gas ranges now. Then along came the electric range. Intense activity placed many thousands of them in our homes before the gas man awoke and demanded something equally as attractive in a gas range. Manufacturers got busy, and gas ranges as they now are constructed were the result. The gas range sold to the public now not only will perform the required duties much better than any other cooking appliance, but it has style, beauty and a new appeal. Gas ranges now stand transformed. They are modern—attractive—and easier to sell, even though the cost is more.

Regarding the cost of gas ranges, the North Shore Gas Company has found its average selling price per range has increased from $83.00 two years ago to $110.50 in 1929. Evidently the market for better grade gas ranges is broadening. Some of this may be a natural trend, but on the whole it has come about because the North Shore Gas Company has stressed month after month the advantages of the higher class gas range. Not only have the benefits been told to the public in newspaper advertising and other publicity, but they have been driven home to the salesmen. It is the salesman who, in the end, is the deciding factor in promoting the sale of better merchandise. He is the one who most influences the prospect, and he can sell either a first class gas range or one of less cost. If the salesman is convinced of the advantages to himself and to his prospect in a good gas range, he is going to make every effort to sell that prospect a more expensive, and hence a better, gas range.

It is an obvious fact that the higher the price of the range he sells the greater his commission, but many a salesman will not, on his own initiative, lift himself from old grooves of selling low priced ranges to the more profitable one of selling more expensive ranges. If a salesman is worthy of his name, however, he will recognize this fact eventually and inaugurate a new era of increased sales volume. The good salesman, too, will realize that if he can sell one woman a good gas range, his chances of selling more in her neighborhood are tremendously increased. The purchaser of a gas range that has everything a woman's heart desires will spread the word about it among her neighbors and other friends, thus creating prospects for the salesman and good will for the company.

When gas ranges in the higher price class first were available, there was some adverse sentiment among salesmen of the North Shore Gas Company. They felt that such ranges could not be readily sold to customers. That feeling existed for only a short time. When salesmen found the range "took," they stepped out and enthusiastically promoted the sale of better ranges. Since that eventful day, the average price of gas ranges sold has shown a sharp upward curve.

There is no doubt about it, that better gas ranges mean fewer electric ranges. The gas industry had a firm foothold on the cooking load until electric ranges appeared on the kitchen horizon. This foothold has slipped a trifle, but most losses can be recovered through the intensive sale of better gas ranges. Women who use electricity for cooking are in the minority, and they can be kept there if gas companies actively promote the modern gas range.

A Monthly Habit

Sales activities on gas ranges should be contiued every month in the year. Not that it is necessary to devote time and energy exclusively to this appliance, but rather to so educate salesmen that they will not forget gas ranges for a minute.

The practice of the North Shore Gas Company has been to place special, intense effort on gas ranges three times a year, with the steady activity just previously mentioned sandwiched in between. These special campaigns are held in the spring, early fall and at Thanksgiving time. All newspaper advertising, window displays and other publicity media are ceded to his

majesty, King Gas Range, for the period of the campaign. No cheap gas ranges are advertised during the campaign or at any other time. High grade gas ranges is the watchword at all times. While this may affect the unit sales volume to some extent, the North Shore Gas Company believes it a better policy than pushing low priced ranges. When your major activity stresses the best, your customers, in time, will be impressed with the fact that if they use a good gas range their cooking troubles are reduced to an absolute zero. When you advertise low priced gas ranges and through that advertising plant a seed of thought in a prospect's mind, it is much more difficult to sell the prospect a higher priced range. Start with the high priced range—stay there if you possibly can—and don't give ground until the prospect finally demands a range of lower price.

After all, low price is not the chief reason for a prospect buying a piece of merchandise. Electric ranges cost more than the type of gas range most people used to buy. Price is a factor in some cases, of course, but if companies will get behind better gas ranges to the limit, there will be an abrupt rise in their sales volume and greater satisfaction for the customer. A satisfied customer will seldom change to any other cooking appliance. Contented customers are a gas company's most treasured possession.

Service is a word well known in the gas business. Primarily that is what every gas company is providing. In order to give this service many departments are maintained, one of the most important of these being the home service department. The function of this department is not to sell but to *give* the customer something. The home service worker is an ambassador of good will, and the value of her work in the interests of gas cooking should never be underestimated. The woman - to - woman contact creates a friendly feeling for the gas company which no other medium could possibly achieve.

The encroachment of electric ranges in the cooking appliance field cannot be treated lightly. If this invasion is not blocked, dwindling gas sales for cooking will be the result. Gas is the logical fuel for cooking, but it is up to every gas company to keep this idea uppermost in customers' minds. The way to do this, as the North Shore Gas Company sees it, is to develop enthusiasm among salesmen so they will sell the best range a prospect's pocket book can buy; to have periodical gas range campaigns and continuous effort through the salesmen; to educate the public in the advantages of a good gas range and to withhold all publicity on the cheaper range; and to place sufficient emphasis on home service. Constant pressure brought to bear on the public mind will make that mind thoroughly gas cooking conscious.

A Page from the Other Fellow's Book

An Outline of Some of the "Tricks" That Might be Advantageously Applied to the Merchandising of Gas Appliances

CHAS. N. TUNNELL

"NO. I never pay any attention to what other merchants are doing, especially in other trades; if I mind my own business, I'm doing pretty well," said a certain gas appliance retailer to the writer some two years ago. It doesn't matter about his name. He is not in business any longer.

This is a day of keen competition, of changing conditions and demand—yet it is a day of big opportunities. The progressive merchant has only to look and investigate to find solutions to his own problems. And he can find many solutions to his own problems in other lines of merchandise other than gas appliances.

L. F. Woodhead of Roswell, New Mexico does not sell gas appliances; but he has built up one of the biggest trades in electrical appliances of any dealer in the state. Fixtures and various appliances are kept displayed in such a way as to create a favorable home-like atmosphere.

The ceiling beams of the decorated interior of the store are divided into spaces and a pretty fixture is displayed from each overhead space. Small individual wall booths have been built for displaying certain fixtures and appliances individually, while the wall panels have likewise been divided into sections.

Sections of the display beams, the wall panels and wall display booths are all numbered, starting at one and continuing on up. Woodhead says, " By numbering every display section, I have greatly increased my fixture and appliance sales. Shoppers drop in just to look about; many times they are not ready to buy until they have looked and compared merchandise at other places. When we see that we can not close a sale, we suggest that they take down the numbers of the fixtures, etc. that they would want in the event they buy from us; then they can write or telephone their needs."

This merchant says further, "Many times the prospect who would make no definite selections, expecting to look further, will go ahead and make selections just to take down the numbers and then become so sold on certain fixtures during the time that they go ahead and purchase the article. At other times, they will telephone us or, if they live in neighboring towns, we often receive a mail order for a particular article stating its display number as 28, 95, 180, etc.

"As every type of fixture and appliance retains a permanent number that is plainly visible on the display section or on the article itself, it is easy for us to fill an order even weeks after the prospect has visited our store. Numbering our appliances and fixtures simplifies installations too. Our bills, estimates, etc. are made out bearing the numbers. A man on the job can send in for an article by number, and there is no mistake. Price tags that become blurred are easily checked up by checking up the number of the article in the records."

Value of Numbers

Although this system is used by an electrical dealer, gas water heaters and other appliances could easily carry a plain stock number or their display section could be numbered, making it easy for the appliance salesman to suggest that the prospect take down the numbers of articles he or she is interested in. This would form a stronger tie and increase telephone and mail order sales.

S. L. Forrest, president and general manager of a chain of lumber yards throughout West Texas, says, "I sell more homes after supper in the prospects' own homes than I do at the office. A call at the prospect's home with my plan booklets and illustrated sales literature at night gets me maximum results. For at this time, I find both husband and wife at home; and at a time when work and business have been forgotten, it is only natural that they are interested in any subject pertaining to the home. These night calls beat calls during the afternoon, for calling at that time finds the man away and the woman is often unwilling to go into the subject in her husband's absence."

This lumber dealer and his salesmen use a great deal of time in the afternoon in telephoning and in getting out among the public to make appointments; their actual selling is done after supper when the family circle can be sold collectively while they are appreciative of home life and modern conveniences.

Forrest has increased his business from one small lumber yard to a chain of five or six within a few years time. His system seems to work—it might be worth the consideration of gas appliance merchants.

Speaking on this same subject, W. S. Anglin, manager of the Texas Power and Light Company's plant at Tahoka, Texas, says, "My regular duties kept me plenty busy during the day time in our little town of two thousand population just to keep the plant running and all business

moving as it should. Back in 1927, we had 332 meter connections with a monthly gross revenue of something less than eighteen hundred dollars.

"I decided that a little extra work in the evenings might produce more than a lot of advertising and other things carried on during the day. Within the next twelve months, we had added sixty new houses to our line load, which was the natural course of business. But during this time, my personal visits at night to a lot of old homes added sixty-four old houses to our pay load, four more old homes than new ones for the year. In addition to adding sixty-four customers to the list that had been previously overlooked, I sold something like five hundred dollars worth of appliances a month while making the night calls in the prospects' own homes, and our monthly revenue has been increased to an average of $3,000."

Mrs. W. G. Clements, president of the Graham Knitting Company of Los Angeles, California, and of the Graham Sport Shops located throughout the United States, recently informed the writer during an interview, "It's the little things that count in selling, whether it is selling in a store or selling from house to house. I operate a dozen or more retail chain shops in addition to my direct to customer sales force that covers the United States. I employ more than five hundred women and girls in this direct selling organization alone.

"And the big thing I find in teaching men and women to sell is that of picturing an article to prospects as it will be in use instead of a mere sing-song description of the article itself. My girls are taught to not describe a new dress or a new coat to the prospect, but to build up a word picture of how this certain dress or coat will appear on the woman and make her see herself wearing such a garment.

"Then to get these word pictures over, a sales person must guard the little things and create a favorable impression. A prospect won't buy from a sales person that stands up in their face, talking and breathing into the prospects face as if trying to drive a sale. One must have a good personal appearance and work first to gain the confidence of the prospect; then sales may be expected," sums up this woman who five years ago was a sales woman selling sport garments, but today heads a manufacturing institution that is one of the biggest of its kind.

Mrs. Clements knows how to organize and train a sales organization. She has found out from years of actual selling. And her experiences will work equally as well in the gas appliance field as it does in that of selling sport wear.

And even Tony Pontikes has a tip that is worth the consideration of the gas appliance merchant, especially the merchant that is thinking of building out from the congested business district where he can provide parking space for the motoring public. Tony operates a fruit stand in his city; and while perhaps not a high calling, yet Tony sells plenty of fruit and owns rental property in several sections of his city.

This fruit stand owner says that a fruit stand will not pay a profit when located on the left hand side of a street if it's out the down-town business district. Tony says that people driving to town on the left side are usually hurrying to work or somewhere else and do not stop to buy fruit; but says he, they do stop at the stand on the right side of the street as they go home, having more time to devote to shopping and naturally thinking of home and its needs.

Needless to say, Tony is located on the right side of the street; and it might be well to investigate this suggestion before building or leasing a building in the residential section or on a street leading to and from the main business district. Probably home owners are thinking more about home as they drive home on the right side of the street, and probably displays will prompt them to stop when they would not turn around and cross the street to investigate.

Gas appliances dealers can't very well copy every fellow's good ideas, but any merchant of the territory that is making a success is worth an acquaintanceship and is worth watching. It may be the operator of a small stand or the president of a big organization, but in either event, watching a successful man's business may suggest new possibilities and new ways of increasing profits.

Cake Baking Contest

Some of the Contestants

THE Home Service Division of Westchester Lighting Company, Mount Vernon, under the direction of Mrs. Ceil G. Harvey, director-in-charge, organized a competition in cake making which resulted in 97 cakes being baked and exhibited by members of the Lecture Demonstration classes of the Company throughout the County.

The winning cake in each district was awarded a small appliance. The cakes won on appearance, flavor, texture and name. Some of the names chosen for the cakes are as follows—Lady Westchester, Home Service Royal, Westlico Sponge, Westchester Hy-Lo, Fluffynuf and Orange Blossom Fragrance.

Recipes for the above will be included in the regular recipe sheets of the Home Service Division of the Westchester Lighting Company.

University of Oklahoma to Give Seventh Gas Measurement Course

The general committee for the seventh gas measurement short course, at a meeting held at Norman, Okla., recently, selected April 15, 16 and 17 as the dates for the 1930 short course. As in former years the short course will be conducted by the College of Engineering, University of Oklahoma, assisted by the Corporation Commission of Oklahoma and the Oklahoma Utilities Association.

The program is now being arranged and is expected to cover a broader scope of subjects than during previous years.

The Law of Taxation

LEO T. PARKER

VARIOUS states have enacted laws requiring payment of taxes on all real and personal property located within the state. In other instances the state laws compel payment of taxes by corporations "doing business" within the boundaries of the state. Some few states have gone so far as to pass laws which impose taxation on the gross receipts of corporations doing interstate business.

Recently the Supreme Court of the United States has rendered several important decisions on taxation. Therefore, the purpose of this article is to cover the legal points involved in these recent litigations, as well as other leading cases which have established the law on different phases of taxation.

What Is Doing Business?

Theoretically, any firm, corporation, partnership or person who transports gas into another state and *retains title to it*, is deemed "doing business" in that state.

On the other hand, the law is well established that no state, or city, or county in a state, may legally enforce tax or other restrictive laws regulating business firms located in different states, providing the transactions are strictly interstate. In fact, such laws are in direct violation to the Constitution of the United States, and are invalid.

Therefore, frequently the outcome of legal controversies involving taxation, license fees and the right to institute suit, is dependent upon whether the transaction is an interstate or intrastate one.

Power of State to Tax Interstate Commerce Business

The law is well established that a state is within its legal rights when it assesses taxes on property *located within* its boundaries, although it is being used in interstate business. However, a state cannot impose a license fee on the *transportation* of gas or other commodity in interstate business, nor can it tax the earnings derived on interstate business from property located within the state.

For example, in New Jersey Co. V State Board of Taxes of New Jersey, 50 S. Ct. 111, it was disclosed that the state of New Jersey enacted a law providing that all persons, corporations and firms doing business within the state shall file a statement showing the gross receipts of their business in the state for the calendar year next preceding, and that "the franchise tax of such person, copartnership, association or corporation for business so done in this state" shall be upon such proportion of *gross receipts* as the length of the line or mains in the streets bears to the length of the whole line or mains. A supplementary law required that companies' gross receipts in New Jersey be included for the calculation of the franchise tax assessed against them.

In holding this law invalid, the Court said:

"The franchise tax upon gross earnings does not purport to be, and is not claimed as, a charge or rental for the use of property belonging to the state or any of its subdivisions..... Clearly the state, when passing the act making the assessment, acted, not as a proprietor demanding compensation for the use of its property, but as sovereign imposing a tax for the support of government..... It is elementary that a state may tax property used to carry on interstate commerce. But, as the Constitution vests exclusively in the Congress power to regulate interstate and foreign commerce, a state may not tax, burden, or interfere with such commerce, or tax as such gross earnings derived therefrom or impose a license fee or other burden upon the occupation or the privilege of carrying on such commerce, whatever may be the instrumentalities or means employed to that end..... This tax cannot be sustained if it is not upon the property but is in fact a tax upon appellant's gross receipts from interstate and foreign commerce or a license fee to be computed thereon."

Double Taxation Is Illegal

If the owner of merchandise or property located within a state resides in another state and this latter taxes him for that property, this action of the state in which he lives affects the right of the state in which the property is situated to tax it also. In other words, two states cannot legitimately tax a person or corporation for the same property. So held the Supreme Court of the United States in the recent case of Farmers' Co. V State of Minnesota, 50 S. Ct. 98.

In this case a corporation located in New York held negotiable bonds and certificates of indebtedness issued by the state of Minnesota and the cities of Minneapolis and St. Paul. Some of these were registered, others were payable to bearer.

The Minnesota State Court held that although the state of New York taxed the property, taxation levied by the state of Minnesota also was valid. The United States Supreme Court reversed this decision and explained the law, as follows:

"In this Court the presently approved doctrine is that no state may tax anything *not* within her jurisdiction without violating the Fourteenth Amendment..... At this time it cannot be assumed that tangible chattels permanently located within another state may be treated as part of the universal succession and taken into account when estimating the succession tax laid at the decedent's domicile.... Nor is it permissible broadly to say that, notwithstanding the Fourteenth Amendment, two states have power to tax the same personalty on different and inconsistent principles.....Taxation is an intensely practical matter, and laws in respect of it should be construed and applied with a view of avoiding, so far as possible, unjust and oppressive consequences. We have determined that in general intangibles may be properly taxed at the domicile of their owner, and we can find no sufficient reason for saying that they are not entitled to enjoy an immunity against taxation at more than one place similar to that accorded to tangibles..... Tangibles with permanent situs therein, and their testamentary transfer, may be taxed only by the state where they are found."

When Interstate Shipment Is Taxable

On the other hand, it is important to know that a state may rightfully tax any property within the boundaries of the state, although the property is *temporarily* detained in the state.

For instance, in the leading case of People V Bacon, 90 N. E. 686, a higher Court held that merchandise shipped from one state to another and which, while passing through a state, is removed from the cars by the owner for the mere temporary purpose of inspecting, weighing, claning, drying, grading, or mixing, is *not* actually in transit, but has a situs in such state which results in it being subject to taxation there. This Court said:

"In construing and enforcing the interstate commerce clause of the federal constitution, the rule has been established by the United States Supreme Court that property actually in transit from one state to another is exempt from local taxation; but, if such property be stored for an indefinite time during such transit *for other than natural causes or lack of facilities for immediate transportation*, it may be lawfully assessed by local authorities."

On the other hand, the mere fact that merchandise is shipped through a state and stopped by the carrier for transfer does not result in this state being legal right to subject the goods to taxation.

Another well established law is that merchandise being shipped from one state to another is not subject to taxation by a state in which the goods are caused to remain by an unavoidable cause. Therefore the principle of the law is settled that a state may tax goods being shipped through the state if for any reason the merchandise is *intentionally* detained there.

Property such as pipe lines, cars and motor-trucks, used by a gas company to transport its property is taxable by the states through which it passes.

Generally speaking, in computing the amount of taxes payable the state officials may estimate the average value of the gas company's property within the boundaries of the state each year.

Highway Taxation Laws are Valid

Obviously, a state may enact valid laws which control the use of its highways and, irrespective whether goods are shipped interstate, a law is valid by the terms of which a state compels persons and corpora-

tions to pay a license fee to travel upon its highways.

For illustration, in Public Utilities Commission V Krol, 222 N. W. 718, in holding a highway taxation law valid, the Court said:

"It is difficult to determine with exactness just when the owner of a motor vehicle is operating as a common carrier, as that term is ordinarily understood in the law, but the Courts have.....been particularly slow to excuse them when their plan of operation bore evidence of being a studied attempt to reap the rewards of common carriers without incurring the corresponding liabilities..... it has been held that all carriers for hire, whether common or private, must submit to reasonable regulations and pay the license fees required as a condition to their use of the public highways."

Taxation Laws Must Be Specific

Of course, the state taxation laws, under which movable property is subjected to taxation, must specifically provide for taxation of this particular kind of property.

For example, in Tamble V Pullman Co., 207 F. 30, a Court held a tax assessment against movable property in the state of Tennessee void, because the assessment was made under *general laws* relating to *general property* within the state. This Court said:

"An examination of the assessment acts discloses no provision for the taxation of property of this character. While these acts provide generally that all property shall be assessed for taxation, the methods of assessing the tax provided in these acts are only applicable, so far as personal property is concerned, to property having *an actual situs* in a given county where it can be regularly assessed for taxation. There is no provision whatever in either of these acts fixing a situs for taxation upon movable and transitory property of non-residents."

In another leading case, Southern V Patterson, 123 S. W. 353, the Court explained that while it is a general rule that all property is taxable by the legitimate acts of Legislature, the proceedings under which a state seeks to assess taxes on movable property are void if the state law provided no definite method or plan for its assessment.

In other words, a valid taxation law must not only specify what property shall be taxed, but it must provide the *methods* for acquiring the valuation of such property, and clothe some person, officer or tribunal, with power and authority to assess such valuation. If the statute contains no such provisions, it is insufficient to subject such property to taxation and, therefore, is invalid.

Must Comply with State Laws

While it is well established that no state, or city, or county, may legally enforce tax or other restrictive laws regulating a gas company located in a different state, providing the transactions are strictly *interstate*, yet if the transaction is *intrastate*, the state in which the gas or other merchandise is shipped may enforce any reasonable law.

Theoretically, any firm, corporation, partnership or person who transports products into another state and *retains title to it* for the purpose of sale, is deemed transacting intrastate business or "doing business" in that state.

For instance, in the leading case of Eisenmayer Co. V George E. Shelton Co., 3 S. W. (2d) 688, it was disclosed that a shipper shipped products into a foreign state believing the arrangement with the consignee was an *interstate* transaction. The shipper failed to comply with the foreign state's laws, one provision of which is that a foreign corporation transacting intrastate business within the state, not having complied with the state laws, cannot maintain a suit against a citizen of the state.

It is important to know that the higher Court held that since the shipper had not complied with the laws of the state in which the merchandise was shipped, he *could not maintain the suit.* This Court said:

"We hold that the undisputed facts show the transactions in this state were intrastate in character, *which constituted the doing of business in this state* in violation of the law, and that appellant (shipper) cannot maintain this action."

When Real Property Is Non-Taxable

Sometimes legal controversy develops over the validity of laws which are intended to tax royalties received by gas companies from the sale of natural gas taken from real property which for any reason is exempt from taxation. Usually, the oil and gas taken from real property is not taxable if the real property is exempt.

For illustration, in Carpenter V Shaw, 50 S. Ct. 121, it was disclosed that a state enacted a statute providing that "all the *lands* allotted shall be non-taxable while the title remains in the original allottee."

Another law provided for a 3 per cent tax upon any royalty interest in oil and natural gas taken from land within the state.

Litigation developed when an allottee refused to pay the 3 per cent tax on gas taken from his land. The Supreme Court of the state held the 3 per cent tax collectable, because the tax is imposed *only* on the oil and gas when severed from the land resulting in the tax being upon personal property not exempt by the statute.

However, the Supreme Court of the United States reversed this decision and held the tax invalid, saying:

"Where a federal right is concerned we are not bound by the characterization given to a state tax by state Courts or Legislatures, or relieved by it from the duty of considering the real nature of the tax and its effect upon the federal right asserted .....We think it plain that the tax imposed on the royalty interest of the present petitioners is not a tax on oil and gas severed from the realty, but is, by its very terms, a tax upon the right reserved in them as lessors and owners."

Frequently the Courts have considerable difficulty in fixing valuation for taxation purposes. Generally speaking, a Court will fix the valuation of a gas company's property for taxation and rate making purposes, in consideration of reasonable present valuation and the expenditures necessary to conduct the business, although other more economical methods may be adopted.

For example, in Florida Public Utilities Co. V City of West Palm Beach, 36 F. (2d) 318, it was disclosed that the Florida Public Utilities Company holds a franchise by virtue of an ordinance dated January, 1915, to supply gas to the inhabitants of West Palm Beach, Florida. The ordinance fixed the rate for gas at $2 for 1,000 cubic feet. In October, 1920, by an ordinance amending the original ordinance, the rates were raised to not exceeding $2.50 for 1,000 cubic feet. By a third ordinance, adopted March 26, 1929, the rates were reduced to $2 per 1,000 cubic feet for the first 10,000 feet furnished each customer and $1.80 per 1,000 cubic feet for any excess. The Florida Public Utilities Company instituted suit to prevent the city from putting into effect this last ordinance.

The counsel for the gas company contended that the ordinance was invalid because the fair value of property used and useful in furnishing gas to the city of West Palm Beach is $946,000, at the new rates prescribed after deducting expenses and depreciation, the return would be less than $40,356 per annum, which is less than 4.27 per cent.

A plant for generating the gas is located at or near West Palm Beach and in each of two other towns there is a distributing system. In fixing the fair value of the property used and useful in the business at West Palm Beach, an expert, employed by the gas company, valued all the property used in furnishing gas to that city and, as to the property used jointly in furnishing gas to consumers in the other towns supplied, allocated to the city of West Palm Beach 70.4 per cent of the fair value of such property, basing his conclusions on the total amount of gas used in the three places in the year 1928.

The counsel for the city of Palm Beach contended that this method of calculating the valuation was incorrect. However, it is interesting to observe that the higher Court granted an injunction against the city putting into effect the new rates, saying:

"This method is usually approved by the Courts. Appellee (city) challenged the correctness of this allocation in argument based on certain statistics appearing in the record showing that the difference between the peak load and the minimum is comparatively very much greater in Palm Beach than in West Palm Beach.....It is no doubt true that a company manufacturing artificial gas is required to have an excess of generating capacity to take care of the peak load, and in fixing the fair value of the property jointly used the fact that for approximately seven months of the year very little gas is consumed at Palm Beach should be taken into consid-

eration. However, it may well be that the distributing system in West Palm Beach exceeds in value the generating plant and the peak load might be taken care of by adequate storage capacity at very much less cost than by a generating plant sufficient to produce enough gas daily to take care of the demand."

EQUIPMENT NEWS

New Chromite Cement Developed by Botfield

Botfield Refractories Company, Swanson and Clymer Streets, Philadelphia, Pa., has developed a new high temperature cement which will be added to its line of Adaproducts and sold under the trade name of Adachrome Plastic Super-Cement.

In this new cement, the basic material is an exceptionally high-grade chromite ore obtained from South African deposits.

Because of its chromite base, Adachrome Plastic Super-Cement is said to be chemically-inert, and is also hard, dense and highly refractory. Furthermore, the new cement employs a bonding agent which is very efficient at high temperatures.

Among the destructive furnace actions to which this new cement is claimed to be resistant are basic and acid slags, molten metal penetration, abrasion, erosion and chemical reaction in the burning of acid sludge. In addition, the material, when applied as a surface coating on boiler settings, protects the brickwork from the penetrating action of clinker and fusible coal ash.

In the field of chrome cements, Adachrome Plastic Super-Cement is reported to be the only cement sold in plastic form, ready for use without laborious mixing prior to use. The material is suited for making either dipped or troweled joints.

Another feature claimed for the new cement is its exceptional plasticity, which contributes to ease of handling and working.

This new cement will be packed in heavy gauge metal drums with full-size openings adding to convenience of use. The drums, which are painted a distinctive yellow with red lettering, have airtight covers that prevent waste or deterioration of the material. Two sizes of drums, 250 lb. and 500 lb., are available. Complete data is offered by the manufacturer to those interested.

New Oxweld Welding Blowpipe

Oxweld Acetylene Company, 30 East 42nd St., New York, has recently announced another new blowpipe. The Type W-17, as it is called, employs the same well-known low pressure injector principles used in other Oxweld blowpipes. It is somewhat similar in design to the Type W-15 Aircraft Welding Blowpipe which has met with such great favor since its introduction about a year ago. The Type W-17, however, is a full-sized blow pipe, large enough for any welding job.

The tip and welding head are of one piece construction, being combined in a long and slender stem of the goose-neck type. The injector is located at the base or handle end of the stem. Each welding head has its own nut for attaching it to the handle of the blowpipe. The nut has been constructed so that it extends beyond the injector when the welding head is detached from the blowpipe and serves to protect the injector from damage due to careless handling. A fine pitch thread makes it possible to tighten or loosen the nut easily without the use of a wrench.

The Type W-17 Blowpipe is compact and light. With the No. 4 welding head it weighs but 24 ounces. The long thin shape of the welding heads makes it possible for this blowpipe to be used in places inaccessible to almost any other type of equipment.

The inner cone of the flame of the Type W-17 Blowpipe is noteworthy. It is shorter and thicker and has a tendency to assume the shape of a ball at the end. This, it is said, speeds up the rate of welding.

Two New Flight Conveyors

The Barber-Greene Company of Aurora, Illinois, have added to their line of coal handling equipment two new drag-type machines—the Model 55 and the Model 56 Plain Flight Conveyors.

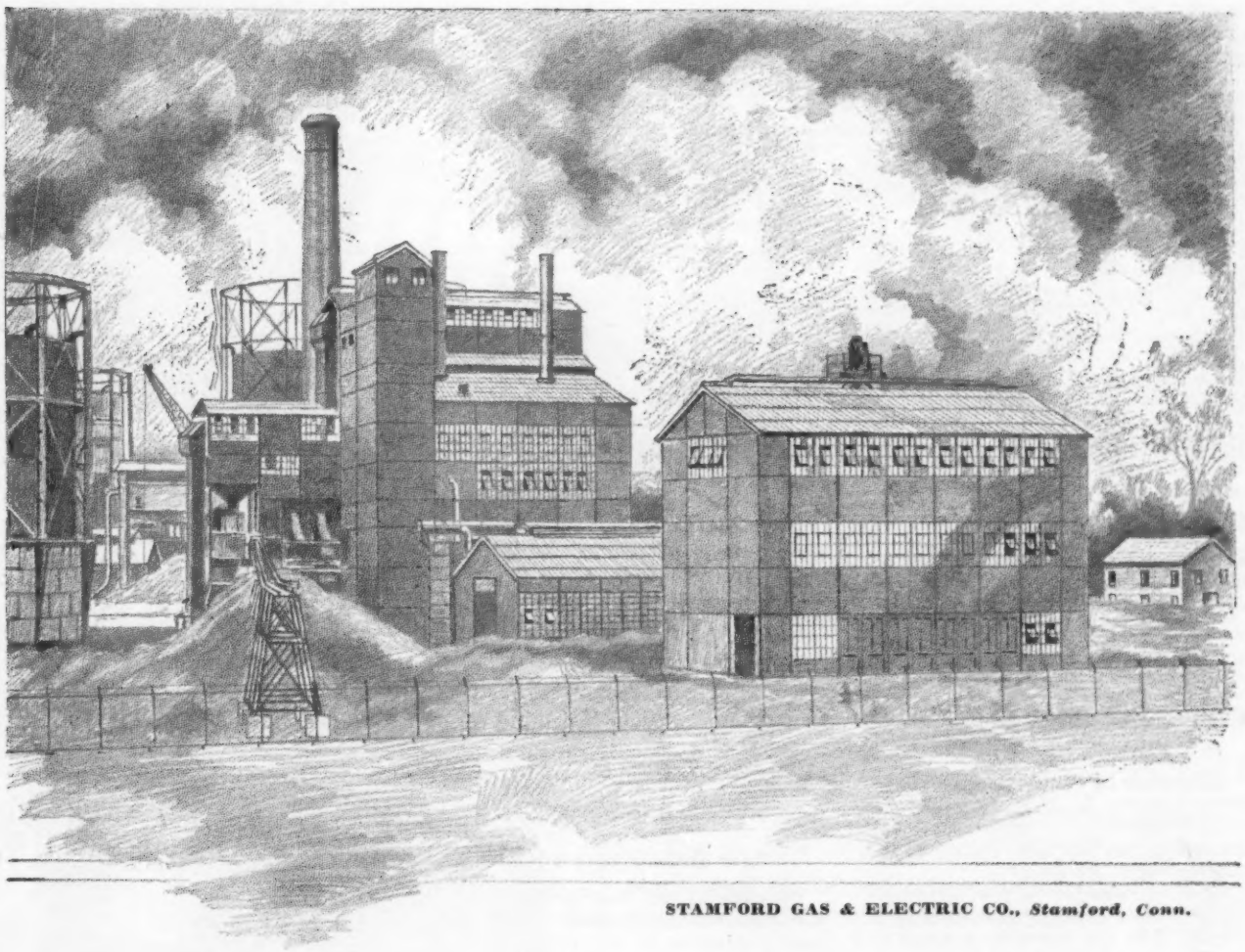
The Model 55 Plain Flight Conveyor is a machine with a handling capacity of a ton of coal a minute, and its construction embodies several new features which it is stated, have not heretofore seen on coal handling machines of its type. The boom is sectional in construction and the machine may be had in boom lengths of 24 ft., 30 ft., and 39 ft., according to the purchaser's requirements.

The truck is built with swivel wheels which allow the machine to build much larger storage piles without moving the actual feeding point. Mounted on the truck is the power unit—either an 8 H.P. LeRoi gasoline engine, or an 1800 R.P.M. electric motor; and the power unit is so mounted that it remains vertical regardless of the angle at which the truck may be operating.

The drive on the Model 55 machine is by chain to the head end. It is relayed by three chain units—one from the motor to a sprocket on the truck mast at the point where the upper boom support arms begin; the second from the base of the upper boom support arm to the point at which it joins the boom; and the third on the opposite side of the boom to insure better balance—to the head shaft.

The conveyor is equipped with a power boom hoist of the self-locking worm type, which is engaged by means of a hand lever near the power unit. The advantage claimed for a power hoist is in the elimination of breakage in loading trucks or unloading to storage piles. By means of the power hoist, it is possible to raise the discharge end of the machine with the heightening of the pile, so that the coal need never fall a distance greater than a few inches. The boom may be raised or lowered while the machine is in operation.

The Model 56 Plain Flight Conveyor is a smaller machine than the Model 55, the maximum available boom length being 24 ft. It is powered by electric motor only, and the boom is raised and lowered by means of a hand winch and spur gear mounted on the truck. It also has a capacity of a ton of coal a minute.



STAMFORD GAS & ELECTRIC CO., *Stamford, Conn.*

Another Gas Utility Produces Its Base Load With Coal Gas.

Glover-West Vertical Retorts, with a daily capacity of 1,100,000 cu. ft., were installed at Stamford in 1926. This is the plant where the A. G. A. Carbonization Committee conducted the tests for their report at the 1927 convention.

The design of Glover-West Retorts is such that you get maximum yields of gas, coke and tar with minimum operating costs.

Other Glover-West Installations

Fitchburg, Mass.
Springfield, Mass.
Portland, Me.
Ottawa, Ont.
Vancouver, B. C.
Victoria, B. C.
Watertown, N. Y.
Malden, Mass.
Fargo, N. D.
Toronto, Ont.
Santos, So. America
Pernambuco, So. Amer.
Santiago, So. America
Buenos Aires, So. America
Pawtucket, R. I.
Fall River, Mass.
Faribault, Minn.
Halifax, N. S.
Belleville, Ont.
Rio de Janeiro, So. America

WEST GAS IMPROVEMENT COMPANY, 441 Lexington Ave., New York

Builders of Coal Gas Plants

Glover·West

VERTICAL·RETORTS

NEWS OF THE GAS INDUSTRY

Capacity of Fort Wayne Gas Plant is Increased

A new water gas generating set with a capacity of 3,500,000 cubic feet of gas every 24 hours recently has been place in service at the Fort Wayne plant of the Northern Indiana Public Service Company.

This new generator incorporates in its design some of the latest developments in the field of gas manufacturing. It is entirely automatic and continuous in its performance, and requires a minimum of attention while in operation. It is also designed to conserve and utilize every possible heat unit.

The addition of the new generating unit at Fort Wayne was made necessary by the rapid increase in demand by industrial and domestic customers there.

Earnings of the United Gas Improvement Company

Net income of the United Gas Improvement Company in 1929 aggregated $28,275,110, according to preliminary figures announced on February 19 by John E. Zimmermann, president.

Gross earnings for the year totaled $32,953,549, while expenses amounted to $4,678,439. The one quarterly dividend paid on December 31, 1929, on the company's outstanding preferred stock, which was issued at the time of recapitalization. amounted to 632,995. Thus, a balance of $27,642,115 is left for application to common stock and other corporate purposes.

In 1928, net income aggregated $21,015,271, against $11,119,530 in 1927, an increase of eighty-nine per cent. This large advance was due to the effect of acquiring the Philadelphia Electric Company in that year. Gross earnings in 1928 amounted to $24,297,364, against $12,900,113 in 1927.

Plan Short Gas House Heating Course

Tentative plans were announced by Prof. R. B. Leckie, professor of gas engineering at Purdue University in West Lafayette, Ind., for a short course on gas heating of homes. The course will be the first of its kind ever held in the United States, it is said. Plans for the course were outlined before a recent meeting of a committee of the Indiana Gas Association held in Lafayette and will be presented at once to the directors of the association.

The course will cover three days and the curriculum is designed to give thorough instruction to heating engineers interested in the problems presented in heating homes by gas. Tentative dates for the school have been set by the committee as April 24 to 27. Morse Dell Plain, a Hammond, Ind., utility official, is chairman of the committee.

New Line to be Built Into Oklahoma City Field

The announcement of the construction of a 20-inch gas pipe line into the large Oklahom City field was made by the Cities Service Gas Company recently. The lines will be constructed by the company to the Oklahoma City field from a point fifteen miles south of Perry, Okla., to connect with the main line system of the company.

The line will be fifty miles in length and is an extension of the 20-inch line from Dillworth, in Kay county, to Perry, completed last fall. The line will have a capacity of 100,000,000 cubic feet daily and will be completed by early summer.

New Holder to be Built

Directors of the Citizens Gas Company here have authorized officers of the company to advertise for bids on the construction of a 6,000,000 cubic foot gas container to cost not more than $350,000 and to be completed this year. C. L. Kirk, vice president and general manager of the company said the new container almost would double the gas storage capacity of the company's two plants and will be erected at the Prospect street plant. The company then will have storage capacity of 13,000,000 cubic feet, increasing the storage capacity ratio to about 80 per cent above the average daily consumption for domestic and industrial users.

Needs of the company for gas storage capacity, permitting economical operation of its battery of by-product coke ovens, will be taken care of for ten years at least when the new holder is built.

Farmington Gets Natural Gas

Farmington, New Mexico, was given natural gas, in middle of February, by the Southern Union Gas Company. The gas supply is obtained from the Summit Oil Company's producing properties. The Southern has agreed to furnish the gas free up to October, as a mark of its appreciation for the cooperation given by the city of Farmington, and incidentally to advertise the comfort and cleanliness and alluring qualifications of natural gas.

Lower Gas Rates

Rates for natural gas service have been fixed for customers in the San Francisco, East Bay and San Jose divisions of the Pacific Gas and Electric Company, which will mean a saving to them of $7,000,000 a year, based on an amount of heat equivalent to their past usage of artificial gas.

These rates will become effective when the second or "Valley" pipeline now under construction from the Kettleman Hills oil and gas fields to the bay area has been completed, which will be shortly after April 1. At that time natural gas will be served in San Francisco and Oakland, as well as in Stockton, Sacramento and other Northern California cities. It is already being served in San Jose and throughout the San Francisco peninsula from Daly City south, in parts of Alameda county and in Salinas, Monterey and Fresno.

Eventually the new rates, adjusted as to distance and other factors, will be applied over the entire area to be served with natural gas.

Will Call for Much Natural Gas

The Phillips Petroleum Company will erect an absorption plant in the Oklahoma City oil-gas field. It will be surrounded by 4,600 acres of producing and potential land and will call for about 50 million cubic feet of gas daily.

Gas Reservoirs Proposed

The use of exhausted gas fields in Jasper county, Indiana, as reservoirs for storing millions of cubic feet of gas now escaping from the Lake county steel mills, is proposed by Richard Lieber, director of the state department of conservation. Lieber asserted the gas fields have been found to be in perfect condition. To store gas for future use, he said, would mean the forcing of gas into stands through one pipe and to have another line for a guage.

Increased Business Necessitates Boosters

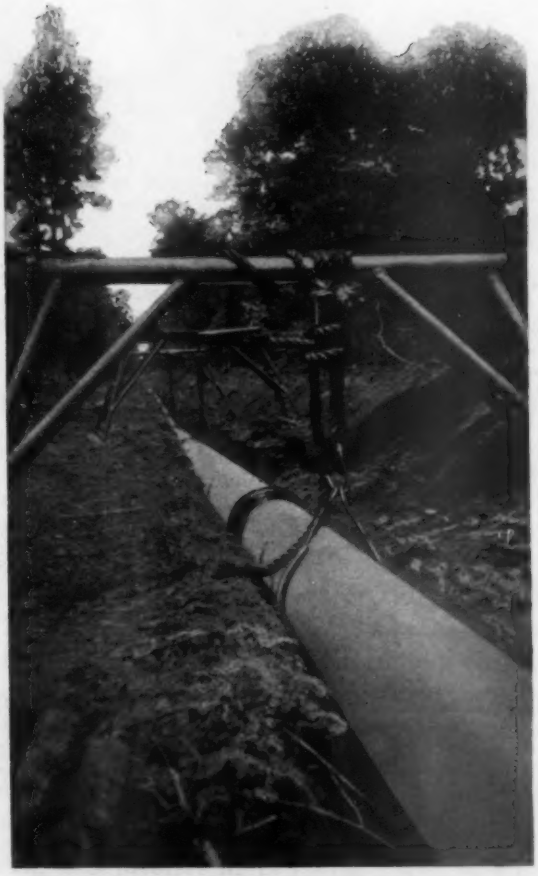
The continued demand for natural gas requires that the Colorado Interstate Gas Company erect a booster plant near Clayton, New Mexico. The work which is under the supervision of B. R. Wilson who has his office in Clayton calls for a 78x130 foot concrete structure to house three large compressors of 1,000 horse power each. Then there must be shops, and houses for the men. The estimated cost is $700,000. This is the Amarillo Texas-Denver Colorado natural gas pipe line.

(*News continued on page 80*)

For the first time in history

..natural gas is available to the southeastern states

BIRMINGHAM
GAS LINE
of
Southern Natural Gas Corporation
FORD, BACON & DAVIS, INC.
Engineers



AS a result of the construction of a 934 mile natural gas transmission system, from the Monroe and Richland fields in Louisiana, east to Birmingham and Atlanta, natural gas is now available to the southeastern states for the first time in history.

The construction includes a 22-inch and 20-inch main line of 496 miles, 438 miles of branch lines, and 17 river crossings, including the Mississippi River. Over 400 miles of NATIONAL Pipe is being used in the project, and over 120 miles of this will be in double random lengths.

In unusual installations such as this one, there is no substitute for dependability. Pipe used in lines that cross mighty rivers, immense flood areas, rolling country, deep ravines and rock formations, must be unusually sound, flexible, and easy to lay. Long life, durability under strains, and strong welds are essential. NATIONAL Pipe's well-established record for reliability under special and difficult conditions—resulting from great strength, ductility and well-finished ends—is substantial evidence of its particular fitness for unusual projects. Particular fitness for unusual projects is one of the reasons why NATIONAL is—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

NATIONAL PIPE

West Virginia Gas News

Ronceverte has granted a 30-year gas franchise to the United Fuel Gas Co., of Charleston.

Work of laying a pipe line from the Wyoming county fields to Welch, where it has a franchise, will be started by the Amere Gas Utilities Co., of Beckley in the near future. The company also has franchises at Keystone and Kimball.

Oil and gas leases on more than 20,000 acres have been assigned by the Mullins Gas Co., to the United Fuel Gas Co. The land is in Mercer county.

Several wells are being drilled near Hurricane, and those already completed are producing from one to three million feet daily.

Rivesville, which once supplied Fairmont with gas, now is to be supplied from Fairmont. Lines are to be run to the town by the Monongahela West Penn Public Service Company.

The oil and gas division of the state department of mines announced it had received 420 applications to drill during the first nine months of its existence. During the same period, 136 notices that wells were being abandoned, were received. The greatest number of applications, 81, came from Boone county, and the second greatest, 51, from Kanawha.

Col. H. R. Wyllie, Huntington manufacturer, has suggested a "community gas exploration project" in the vicinity of that city. A seven-acre, city-owned tract was offered by a city commissioner, upon which to make a test.

W. A. Larner, Chester W. Larner, Arthur Peck and Nathan A. Smythe, of New York and P. D. Koontz, of Charleston, were elected directors of the West Virginia Gas Corporation by preferred stockholders, who were placed in charge of the company's affairs by a recent court decision.

The United Fuel Gas Co.'s schedule for 1930 calls for the drilling of 140 wells, extending its lines and other expansions and improvements, which is estimated to cost $1,800,000, according to John P. Chenoweth, Charleston agent.

Oil and gas leases on certain tracts in Jackson, Mason, Kanawha and Putnam counties have been given by Frank Cox and G. V. Wilson, trustees, to the Hamilton Gas Co., for a consideration of $4,000.

Godfrey Cabot, Inc., has brought in a 7,000,000-foot well and Scholtz & Grosscup a 3,000,000-foot well. Both are on Armstrong creek, Fayette county.

Leases on 100,000 acres of land in the Bradshaw district of McDowell county, are being sought by the United Fuel Gas Co., according to Welch reports. Several large tracts have already been signed up. The company plans to extend its lines through McDowell county into Virginia, it announced recently.

File Petition to Issue Gold Bonds

Petition to issue $106,000 in gold bonds of the Indianapolis Gas Company has been filed with the Indianapolis Public Service Commission by the Citizens Gas Company. The proposed issue, which will bear interest of 5 per cent, is to obtain funds to reimburse the company treasury for money spent in additions and betterments to the gas system during the last six months of 1929. The improvements include more than $95,000 for mains. The bonds would constitute a lien on that part of the property owned by the Indianapolis Gas Company which is under lease by the Citizens Gas Company and which was improved.

Convention Calendar

March

19-20 Illinois Gas Association, Springfield, Ill. George Schwaner, 305 Illinois Mine Workers Building, Springfield, Ill.

27-28 Empire State Gas and Electric Association, Gas Section, Hotel Mark Twain, Elmira, N. Y. R. Van Vliet, New York and Richmond Gas Company, general chairman.

April

9-11 Distribution Conference, Hotel Statler, St. Louis, Mo.

9-11 Mid-West Bituminous Coal Conference, Purdue University, Lafayette, Ind.

14-16 Mid - West Gas Association, Waterloo, Iowa. R. B. Searing. Sioux City, Iowa, secretary.

16-17-18 Arizona Utilities Association, Arizona Biltmore Hotel, Phoenix, Ariz. Mr. J. S. Arnold, Central Arizona Light & Power Co., Phoenix, secretary.

22-24 Southern Gas Association, Savannah, Ga. G. H. Schlatter, Birmingham Gas Co., Birmingham, Ala., secretary.

24-25 Wisconsin Utilities Association, Gas Section Convention, Hotel Racine, Milwaukee, Wis. John N. Cadby, Room 502, 105 Wells Street, Milwaukee, Wis., executive secretary.

25 New Jersey Gas Association Convention, Asbury Park, N. J. H. E. Cliff, Public Service Electric & Gas Company, Newark, N. J., secretary.

29 May 1 Pennsylvania Gas Association, Wernersville, Pa. F. W. Lesley, 125 West Market Street, York, Pa.

May

5-8 Natural Gas Convention, Roosevelt Hotel, New Orleans, La. E. J. Stephany, Allen Building, Dallas, Tex., secretary.

21-23 Joint Production and Chemical Conference, Hotel Cleveland, Cleveland, Ohio.

Natural Gas Turned Into Mains

Natural gas was recently turned into the service mains supplying customers in East Point, College Park and Hapeville, and into the mains supplying the Peachtree Road section of Atlanta, Ga., it has been announced.

A large force of workmen have begun the task of adjusting the gas burning appliances of customers for the use of natural gas, and the work of supplying natural gas to other sections of the city will go forward as fast as these adjustments can be made.

Greenwich Gas Company Retains N. E. G. A. Governors Cup

Greenwich Gas Company, Greenwich, Conn. retains New England Gas Association Governors Cup by having the largest percentage of sales to customers of automatic hot water heater for 1929. Permanent possession was acquired by the winning cup for three years. Presentation was made at the annual convention in Boston by William Gould past president of N. E. G. A. to Howard, Bennett, Commercial Manager, Greenwich Gas Company.

A. G. A. Meritorious Service Award

The highest award the gas industry can confer in recognition of heroic action is the celebrated Meritorious Service Medal, which is offered each year by the American Gas Association to an employee of a member company for the most meritorious act eiher in the saving of human life or property. This award, which is made by the Executive Board of the Association, consists of a gold medal and button and a certificate setting forth the act. It is an award to be highly prized, not only by the recipient but by the company which employs him.

Application for awards covering deeds performed during the 1929 calendar year must be filed at A. G. A. Headquarters on or before April 15, 1930. The conditions under which an award is made and application forms will be supplied on request of Association Headquarters. The award is available to employees of all manufactured and natural gas company and manufacturer company members of the American Gas Association.

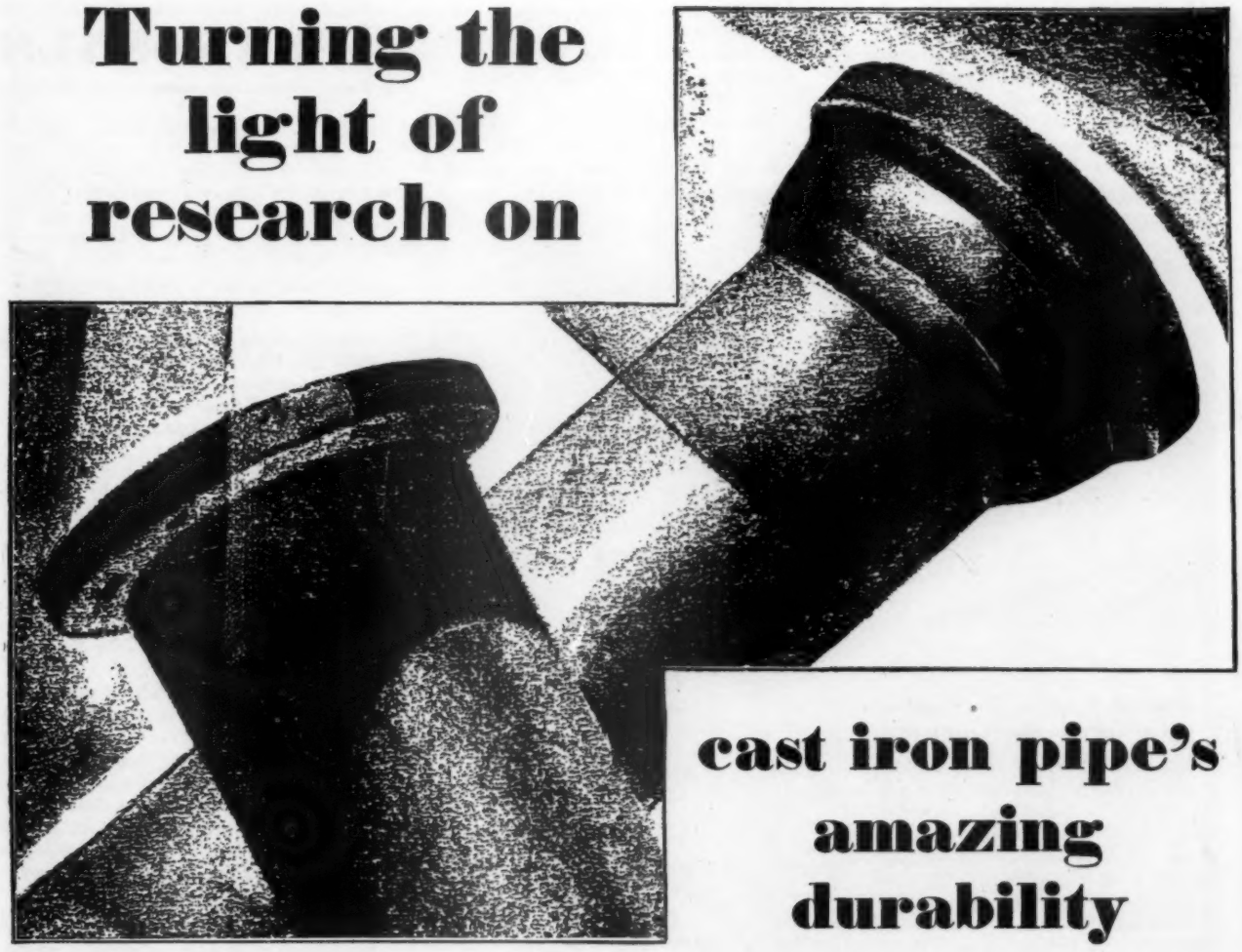
This medal and button, made available through the generosity of Walter R. Addicks, senior vice president of the Consolidated Gas Company of New York, are beautifully wrought in gold.

Will Put In Natural Gas Service

The Missouri-Kansas Pipe Line Company purchased from Kennedy & Rowe a pipe line in the vicinity of Jacksonville, Illinois and expects to provide gas service to serve the community for several miles about.

(*News continued on page 82*)

Turning the light of research on



cast iron pipe's amazing durability

WHY is it that rust does not destroy cast iron pipe? Why is it that cast iron pipe serves for centuries? Why is it that cast iron pipe is the only pipe whose full life span has never been measured?

Research reveals the answer to these questions in the structure of the metal itself. Under the microscope cast iron appears as a mass of irregularly shaped non-corrodable particles of graphite, embedded in iron. When exposed to air and dampness oxidation may set in. But, the action of oxidation cannot seriously disturb these tiny particles. Being bound together, they cannot rise up, exposing surface after surface.

When oxidation attacks a cast iron pipe, the particles of iron in the outside metal structure undergo a chemical change but remain securely in place. Thus they form a natural protective coating to the metal underneath. When considering the kind of pipe to be chosen for water, gas, sewerage or industrial uses, the factor of economy will doubtless receive prime consideration. And, looked at from this angle, cast iron pipe's proved durability over a period of years makes it the most economical pipe known.

The "Q-check" symbol shown above has been adopted as the trade mark of The Cast Iron Pipe Research Association.

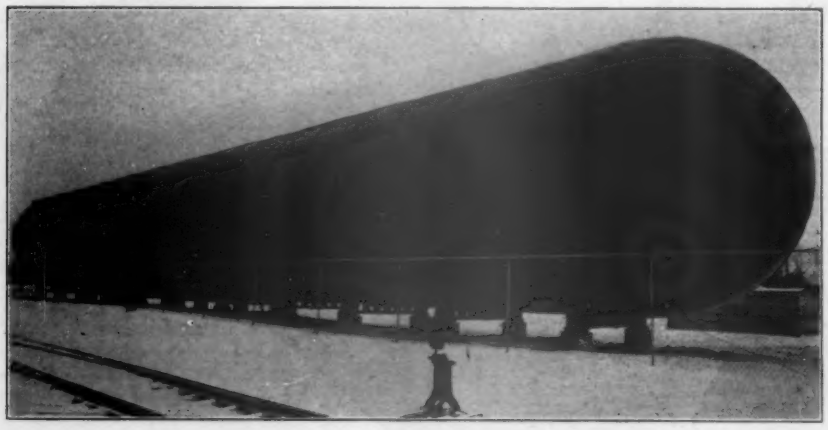
For additional information write to the Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago.

The Cast Iron Pipe Research Association is a service organization of leading pipe founders, formed to promote the scientific improvement and proper use of Cast Iron Pipe. Pipe bearing the Association "Q-check" mark may be obtained from the following: Alabama Pipe Company, Anniston, Ala.; American Cast Iron Pipe Company, Birmingham, Ala.; James B. Clow & Sons, 219 N. Talman Avenue, Chicago, Ill.; Donaldson Iron Company, Emaus, Pa.; Glamorgan Pipe and Foundry Company, Lynchburg, Va.; Lynchburg Foundry Company, Lynchburg, Va.; National Cast Iron Pipe Co., Birmingham, Ala.; United States Pipe and Foundry Co., Burlington, N. J.; Warren Foundry & Pipe Co., 11 Broadway, New York.

CAST IRON PIPE

A Zeppelin Type Storage Tank

A Zeppelin shaped high pressure gas tank was recently installed by the Wisconsin Gas and Electric Co., a subsidiary of the Electric Co. at Waukesha, Wis. It is 185 feet long, twenty-five feet in diameter, and has a capacity of 354,000 cubic feet under 60 pounds pressure, according to George W. Boteler, assistant manager at Waukesha. It is used as a stabilizer and reserve on the high pressure line from Racine to Waukesha, Oconomowoc, Watertown, Jefferson, Fort Atkinson, Whitewater and Lake Mills. This system is one hundred twenty-five miles long. The peculiar Zeppelin shape was adopted because it resists pressure better.



Annual Report of Southern California Gas Company

In his annual report to the stockholders, A. B. Macbeth, president of the Southern California Gas Company, stated that 1929 was the largest in the company's history from the standpoint of gas handled. During the year full natural gas was turned on to the entire system for the first time, and the total of over seventy-seven billion cubic feet of gas was handled. This compares with over sixty-five billion handled in 1928, and the previous record of 1924, when only slightly less than sixty-nine billion cubic feet of natural gas, re-formed gas, and oil gas were handled.

As of December 31, 1929, the Southern California Gas Company had 236,445 meters on their system a gain of 15,249 during the year as compared with 13,804 gain in 1928. This expansion in the number of customers entailed the addition of over 393 miles of mains bringing the total number of miles of main in service to over 4685. The miles of main gained in 1928 was 278.

Gross income for the Southern California Gas Company for 1929, Mr. Macbeth announced, was $17,295,291. The balance available for return on the investment, after bond interest, was $2,941,668. During the year rate reductions were made which effected a saving to the customers of $600,000.

Mr. Macbeth further stated that during the year 1930 their plans call for an expenditure of approximately $4,000,000 in extensions and betterments.

Gas Business Growing

The Uintah Gas Company serving Vernal, Utah, with natural gas, from the Ashley structure, is negotiating with Grand Junction Colorado to accept its gas service and has asked for permission to serve Craig Colorado with natural gas, this service to be handled from the gas in the Marapi's field about thirty miles distant. Ray Phebus of Thermopolis Wyoming is president of the Unitah concern.

Gas Companies Plan Extensions in New England

More than $10,000,000 will be expended by New England gas companies in 1930 for extensions and improvements.

The Brockton Gas Light Company will expend about $75,000 in a new water gas set, which will complete a three-year program involving the expenditure of over $1,000,000. This has enabled the company to extend its service into nine towns not heretofore served.

The Eastern Gas and Fuel Associates are planning to spend $6,000,000. This includes $2,500,000 for the Boston Consolidated Gas Company and $200,000 for the Old Colony Gas Company, controlled by this association.

The Manchester (N. H.) company is planning to expend $450,000.

Report Promising Gas Fields in Indiana

Promising gas fields are indicated along the eastern edge of Monroe and Lawrence counties in Indiana, according to a report made public by Dr. W. H. Logan, state geologist. Two wells recently completed in Monroe county tapped a large reservoir of natural gas. The developments have opened for testing a large area along the west.

PERSONALS

H. C. Blackwell has been elected a Vice President of the Columbia Gas & Electric Corporation. Mr. Blackwell has for some while been President of the Cincinnati Gas & Electric Company, the Union Gas & Electric Company and some other subsidiaries of Columbia Gas & Electric Corporation, all of which positions he is retaining in addition to his new office.

A. J. Berta, formerly assistant treasurer of the North American Light & Power Company, Chicago, Ill., and its subsidiaries, was recently elected treasurer of these companies, succeeding P. L. Smith.

On February 16, Mr. Berta celebrated his tenth anniversary with this Company and its predecessors.

Mr. Berta's career in the public utility field began with the Middle West Utilities Company, in 1918. The foundation of his banking experience was obtained with the Harris Trust and Savings Bank and The National City Company.

Richard P. Kraft, who formerly had been in charge of the Distribution Department of the New Haven (Conn.) Gas Light Company, recently was appointed engineer of that company to fill the vacancy caused by the death in December of Robert E. Wyant. In his new position Mr. Kraft will have charge of both the distribution and production departments.

He is a native of New Haven and was graduated from Yale University Sheffield Scientific School in 1899. Following his graduation he was employed for a number of years by gas companies in Pittsburgh, Milwaukee and Detroit. In the latter city he was chief engineer of the company. For some time before coming to New Haven in 1927 he had been engaged in consulting engineering work.

Walter A. McDonough was recently elected assistant secretary of the Northern Indiana Public Service Company.

Mr. McDonough is chief clerk in the Accounting department in the general offices of the company in Hammond. He came to this company January, 1922, as auditor in the general offices, and on September 1, 1927, was promoted to his present position.

Previous to his coming to this company, Mr. McDonough was with the Beloit Water, Gas and Electric company, as assistant auditor, from 1920 until 1922.

H. Edwin Olson was recently elected Assistant Treasurer of Columbia Engineering & Management Corporation, 61 Broadway, New York City. Prior to his joining Columbia System in the spring of 1928, Mr. Olson was directing the auditing and system accounting in the capacity of General Auditor for other large public utilities for a period of years.

(*Personals continued on page 87*)

KLIXON

SAFETY PILOT B-1226
FOR CIRCULATING TANK HEATERS
—SNAP ACTING

—NO ADJUSTMENTS

—INSTALLED WITHOUT

SKILLED LABOR

—LASTS AS LONG AS THE
HEATER

We urge you to clip the coupon now and send for complete information

SPENCER THERMOSTAT CO.

CAMBRIDGE, MASS.

Please send your bulletin on safety pilots for circulating tank heaters

Name .....

Address .....

Company .....

Manufactured or Natural Gas?

THIS IS *the* NEW KOMPAK

Special Features

THERMOSTATIC MIXING VALVE.

UNIFORM HOT WATER TEMPERATURE.

INCREASED BOILER CAPACITY.

NEW ATTRACTIVE DESIGN.

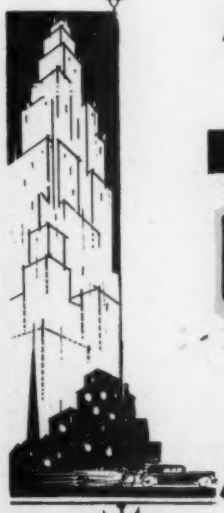
DURABLE ENAMEL FINISH.

LOWER GAS BILLS.

THE KOMPAK CO.

NEW BRUNSWICK, N. J.

BEAUTIFUL



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A NEW PRINCIPLE
BASIC · SCIENTIFIC
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A NEW DRESS
NEW BEAUTY

A NEW HIGH QUALITY
NEW LOWER PRICE

THE KOMPAK CO.
NEW BRUNSWICK, N. J.

MODERN

MAGIC CHEF
is the Ideal Range for the New Home

UNLESS the gas range has a RED WHEEL it is not a LORAIN

Showing "Jonquil" Model of Magic Chef in Modern American Kitchen

ALL BUILDING authorities agree that 1930 will witness a national revival of construction work on new homes. The kitchens in these thousands of new, modern homes will be made more beautiful, more colorful, more efficient than ever before. To accomplish this architects, builders and home-owners will seek new kitchen furnishings and appliances of modern design to add to the beauty, comfort and efficiency of this most important room in the home.

Aside from being the world's most beautiful and most modern cooking appliance, "Magic Chef" embodies a combination of service-features that makes it an incomparable cooking appliance from the woman's point of view.

For this reason "Magic Chef," the New Vogue in Gas Ranges, will have a strong and distinct appeal to all classes interested in the building and furnishing and decoration of homes. Therefore, whenever you have a prospect for a gas range to be installed in a new home NEVER fail to show "Magic Chef" first. For, even though "Magic Chef", for some reason or other may not meet the buyer's requirements, the effect that its unusual beauty creates in a buyer's mind will enable you to sell a better gas range than you could have sold otherwise.

Magic Chef

The World's Most Beautiful Gas Range

CASH-PRICE
$195.00

($210 West of the Rockies)
Send name and address for free copy of booklet showing modern kitchens.

AMERICAN STOVE COMPANY • • DEPT. B, 801 CHOUTEAU AVENUE, ST. LOUIS, MO.
Largest Makers of Gas Ranges in the World

A. G. Packwood, formerly commercial manager of tthe Illinois Power & Light Company at Mt. Vernon, is now associated with the Central States Gas Company at Anderson, Ind., in the capacity of commercial manager.

James Ashworth, Superintendent of Distribution, Hudson Division Gas Distribution Department of the Public Service Corp. of New Jersey completed on January 1, twenty-five years of continuous service with Public Service, and received his gold button.

Mr. Ashworth began with Public Service as a Cadet Engineer in the Camden District, Gas Distribution Department.

During the first few years he was assigned to Gas Distribution Works Operating and Construction Work, and in 1910 was transferred to the Hudson Division Gas Distribution Department as Superintendent of Distribution.

K. B. Anderson has joined the Coast Counties Gas and Electric Company, Santa Cruz, Calif., as Industrial Gas Engineer. Mr. Anderson was formerly Supervisor, Bureau of Unaccounted for Gas, Southern California Gas Company.

Charles M. Breitinger was appointed auditor of Philadelphia Electric Company recently. He has been in the employ of that company since 1916, when he started as statistician. In 1926 he was made an assistant controller, and in 1928 an assistant treasurer. He is also assistant treasurer of a number of the subsidiary companies of Philadelphia Electric Company.

J. R. Harvin, formerly associated with Cravath, de Gersdorff, Swaine & Wood, was recently elected Assistant Secretary of Columbia Engineering & Management Corporation, New York. Mr. Harvin has been a member of this organization for some time.

R. J. Malcomson, formerly Manager of Lighting Sales, of the Public Service Co. of Northern Illinois, Chicago, has been appointed Assistant to the Vice-President in Charge of Sales. In his new position Mr. Malcomson will perform such duties as are assigned to him from time to time by the Vice-President in Charge of Sales, and he will be responsible for the Lighting Sales Dejartment, the Sales Promotion Department and the Director Sales Training.

J. Edward Davey was recently elected Assistant Treasurer of Columbia Engineering & Management Corporation. Mr. Davey was formerly an officer of the Missouri Pacific Railroad Company in New York City.

J. Kenneth Mayer was recently transferred to Dover, N. J., as District Manager of the Jersey Central Power & Light Corporation.

W. W. Freeman has resigned as Vice-President of Columbia Gas & Electric Corporation, also as Director and official of various Columbia Company subsidiaries, and has accepted election as Chairman of the Board of Directors of Intercontinents Power Company, which is a Delaware Corporation owning and operating a substantial group of electric light and power companies in South America, located in Argentine, Chile and Brazil.

Mr. Freeman's headquarters will be in New York. He wil lshortly visit the South American main offices of the Company in Buenes Aires, and make a thorough survey of operations before returning to New York.

Ralph P. Smith has been appointed Superintendent of Gas Manufacture, Connecticut Power Co., New London, Conn., to succeed Mr. J. J. Dowling who is now Assistant to the Manager.

Mr. Smith, although a native of New London, came to the New London plant from Canton, Ohio, where he had been operator in the United Alloy Steel Company's coke oven plant. Previous to this he was chemist with the American Malleable Iron Company in Lancaster, N. Y., later transferring to their Owaso, Michigan Division as an Assistant Superintendent.

O. G. Whitecotton, was recently appointed Electric and Gas Engineer for the Schenectady Division of the New York Power and Light Corporation. In this position, Mr. Whitecotton supervises engineering of both electric and gas maintenance in Schenectady, Ballston Spa and Saratoga and intervening territory.

Charles F. Ribley, since 1923 Gas Superintendent of the New York Power & Light Corp., at Schenectady, was recently appointed Gas and Electric Superintendent of the Schenectady District, his new duties including supervision of both gas and electric distribution and service. Mr. Ribley's first connection with the New York Power organization was on March 1st, 1923, when he left The Syracuse Lighting Company and entered the Schenectady district as Gas Superintendent. He was Engineering Assistant at Syracuse from 1922 to 1923, and previous to that, a Cadet Engineer for two years. His entrance into the utility field began in 1919 at Syracuse as Works Clerk, immediately following his graduation from Syracuse University where he received a degree in Mechanical Engineering.

John D. Williams was recently transferred to the Jackson, Mich. office of the Consumers Power Company, to fill the position of general superintendent of the gas department which was made vacant by Mr. W. E. White's transfer. Mr. Williams was superintendent of the Flint Gas Plant, where he had been located since 1924.

James A. Brown, for many years in charge of gas engineering for the Consumers Power Company at Jackson, Mich., recently left there to make his headquarters in New York. Mr. Brown is chief engineer for Stevens and Wood, Incorporated and assistant to W. H. Barthold in charge of gas operations for the Allied Power and Light Corporation.

Scott Turner, Director of the United States Bureau of Mines, has just been elected Vice President and Director of the American Institute of Mining and Metallurgical Engineers. In addition, he was recently elected Chairman of the Washington (D. C.) section of the same organization.

George R. Strimbeck has been appointed superintendent of the Gas Plant of the Consumers Power Company at Flint, Mich. Mr. Strimbeck was formerly assistant superintendent. He came to the Consumers Power Company after obtaining his master's degree at the University of Michigan and since that time has been on duty in the Lansing and Saginaw River Gas plants.

W. E. White, who has been general superintendent of the Jackson gas department of the Consumers Power Company, has been appointed assistant chief gas engineer of Stevens and Wood, Incorporated with offices in Jackson, Mich. He will have charge of gas engineering and construction work, as well as supervise operation of the gas properties.

Omar Vachon of the Central Main Power Company, Augusta, is the winner of a $200 gas range for selling the greatest amount of merchandise in the 1929 Employes' Gas Appliance Contest.

J. M. Mitchell was promoted to sales supervisor of the Hester Street office of the Consolidated Gas Company of New York.

Other promotions include D. Johnstone, sales supervisor of the 14th Street office, J. Clavin, sales supervisor, 57th Street office and T. Burke, sales supervisor, Third Avenue office.

E. J. Niedekorn, formerly local manager at Wabasha, has been promoted to the position of divisional merchandise manager of the Northern States Power Company, at Red Wing, Minn.

Oscar L. Moore was elected a Director of the Los Angeles Gas & Electric Company to fill the vacancy on the Board caused by the death of the late Champ S. Vance.

Mr. Moore, who is Manager Customers Department, has been with the company over 25 years. He began September 29, 1904, as a clerk in the Gas Department, later serving in the Bookkeeping and Accounting Departments. On January 1, 1912, he was made Assistant Auditor, becoming Auditor on October 1, 1917. He was advanced to his present position of Manager Customers Department on March 1, 1925.

Kenneth C. Ogden, for some years Commercial Engineer of the Westchester Lighting Company, Mount Vernon, N. Y., has resigned to accept the position of Sales Engineer of the Niagara Insul-Bake Specialty Co., Inc. of Albany, N. Y., moulders of special bakelite parts. The Niagara Insul-Bake Specialty Co. have opened a branch office in the New York Central building, No. 230 Park Avenue, New York City, where Mr. Ogden will have his headquarters.

First Natural Regional Gas Sales Conference Greatly Exceeds Expectations

WITH an attendance of approximately 250, the First Natural Regional Gas Sales Conference held at the Hotel Schenley, Pittsburgh, Pa., February 10th and 11th, was productive of a number of good papers and subsequent discussions and reflected considerable credit on the American Gas Association for originating the idea of the meeting.

In his paper "Relationship Between Operation, Utilization and Sales in the Gas Industry," Mr. E. A. Munyan brought out that the average salesman has an arduous job and those from the school of hard knocks frequently turn out the best. He stated that the technically trained salesman often jumps at conclusions, but in the long run, however, he should make the best man.

He advised that the Installation Department should do its work in a neat and workmanlike manner.

Mr. Munyan had on display a number of pictures showing industrial meter installations in his company's territory. One of these showed the partially completed meter installation in the new 18 story office building of the Union Gas and Electric Company in Cincinnati, which building is heated with gas. Another showed an installation of the Linderman electrically operated orifice meter located at a steel mill in Northern Kentucky. This steel mill now has a consumption of 20,000 cubic feet per hour and will ultimately consume 900,000 cubic feet per hour. It is stated that this is the first time that such a device has been used for measuring gas to industrial customers.

He recommended that industrial installations should be made on time and preferably on Sundays, holidays or at the most convenient time for the customer, even though this might run into added expense. This he said makes for good will and further offsets any increase in expense.

Mr. Munyan also brought out that his company always assures its salesmen that they will increase the facilities of its distribution system and otherwise do everything possible to deliver the gas they have sold.

F. C. Mackey, Public Service Company of Northern Illinois, read a very interesting paper, "Every Employee a Salesman—Selling the Employee the Idea of Gas Service." In this he outlined what his company has done in encouraging the employee to make contacts with customers, ultimately suggesting that the customer allow the company to send a salesman for an interview.

He compared the general scheme to the organization in the United States Army and spoke of the various contests his company has held in selling appliances and equipment. He stated how various charts, such as large thermometers, are used to show the periodic status of any of the contests and also told of the good effect of various lithographed posters.

At the meetings held to further these ideas, he said that employees' wives are also invited from time to time and that there is frequently accelerated selling after such get-togethers. He spoke of the value of working in timely events of the day. In four months last summer he stated that one contest was productive of $200,000 worth of business and on the strength of this the six leading men had their expenses paid to the Atlantic City A. G. A. Convention.

A number of men took part in the discussion of Mr. Mackey's paper and Mr. George Whitwell pointed out some of the pit-falls of the system, stating that some of the employees are prone to cheat now and then, even though such cheating is relatively rare.

Mr. Whitwell said that there is also the man to contend with who has really not gotten the proper idea of the story. Mr. Whitwell gave figures on actual campaigns, showing a loss in bad accounts to be exceedingly small. In concluding he said the system must have 100% executive approval.

Mr. S. B. Severson, who read a paper, "Cooperation by the Operating, Utilization and Sales Departments in Promoting Sales," said that it was felt for some time that natural gas would sell itself, but this was eventually found to be erroneous. He recommended close cooperation between all departments in order to foster sales. He stated that the salesrooms must be attractive and up-to-date and the appliances advantageously displayed. He voiced the increasing need for trained salesmen and told of the many social gatherings his company holds which assist in the matter of cooperation. He indicated that every employee should endeavor to cultivate the friendship of the public.

In a further discussion of the subject, Mr. Munyan touched upon the matter of numerical index meters and the fact that these are gradually being installed, particularly for industrial users of gas.

"Contacts by Women," was the title of a paper read by Mr. G. W. Ousler, Equitable Gas Company, Pittsburgh, Pa. In this paper he brought out that the women represent nearly 90% of the buying power of the entire country and went on to state how this buying power should be catered to.

He told how his company through its Home Service representatives contacted the customer in three ways; first, in the home, second, over the radio and third in their own Utility Hall.

In concluding he said, "I think we can truthfully say that the trained home service worker is the housewife's representative in the Utility business. She can personalize and visualize the benefits to be derived from appliances. The disappointment in finding that any purchase does not live up to the salesman's description of it is keen and lasting, and it is through the home service department that such mistakes are avoided, or once they have happened, are rectified.

"We believe contacting the housewife through women in our industry is invaluable and strongly recommend to those companies who either through timidity, or lack of sufficient thought, have not had the courage to adopt such an activity. It will net a return on the investment."

At the well attended Conference Luncheon on the first day, an address was given by Mr. C. E. Paige, Vice-President of the American Gas Association.

"Increased and Improved Home Contacts Through Meter Readers," was read by E. C. Weston of the Ohio Fuel Gas Company. Mr. Weston stated that they are trying to cut down the number of meters read by one man so that he can have time to get over the gas company story to the customer. He admitted that this would of course increase meter reading expense, but would decrease public relation expense and otherwise compensate and pay for itself. He gave a number of instances where meter readers can make suggestions to the customer that can result in sales.

On the afternoon of the first day's meeting, Mr. Henry Loebell spoke on "Training Industrial Salesmen" and in his talk he ventured the opinion that it is very hard to get an industrial salesman who is both a first class salesman, as well as a first class technologist.

"Industrial Business in the Heavy Metallurgical Field" and "Industrial Business in the Light Metallurgical Field" were titles of papers that were read by Karl Emmerling, East Ohio Gas Company and E. W. Esslinger, Union Gas & Electric Company, respectively.

The subject of "Better Methods of Selling House Heating—Sale of Conversion Burners," by George L. Scofield, Dominion Natural Gas Company, came in for considerable discussion and it seemed to be the general consensus of opinion both as outlined in Mr. Scofield's paper, as well as in the ensuing discussion, that conversion jobs are very well worth looking into and pushing where the conditions warrant the same.

Mr. V. L. Black, Equitable Gas Company, handled the same subject from the standpoint of the straight gas designed house heating furnace.

At the Conference Luncheon on the second day a number of interesting addresses were given.

(*Continued on page 92*)

NOW—*the Selling of* INCINERATORS

can profitably be made a MAJOR ACTIVITY

HERE IS THE LINE

—a model for every use
—a price for every purse

In the combined lines of Kernit and Kleenburn Incinerators you have a size, style, finish and price to fit every purchaser. Nowhere else can you get as much variety, as much value, and as much sales appeal as you will instantly appreciate in the Kernit line.

MERCHANDISING HELP

that gets the business—
in profitable volume

Kernit management are gas men. They know your problems. They have been on your job. This combined experience has been incorporated in sales plans that are tuned to your needs. Every element in the profitable selling of Incinerators has been built into a merchandising program that will get the business for you.

THE MARKET IS READY

—cash in on it with the Kernit "Co-ordinated" Sales Plan

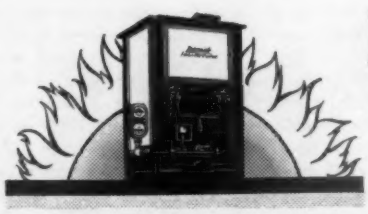
The public's appreciation for the need of dependable, economical incinerators is growing rapidly. Your market is a rising market. The modern home is made strictly modern with a Kernit or Kleenburn. And every hospital, public building — everybody with a problem of trash, rubbish and garbage disposal is a prospect for you.

A Real Team to Team With

Kernit
REG. U.S. PAT. OFF.
GAS-FIRED INCINERATOR

KLEENBURN INCINERATOR

WRITE FOR
the complete details of the
KERNIT SALES PLAN



KERNIT INCINERATOR CO.
AMPERE, N. J. MILWAUKEE, WISC.

Affiliated with
KERNER INCINERATOR COMPANY

New England Gas Association Discusses Important Problems At Their Fourth Annual Meeting

The fourth annual meeting of the New England Gas Association, which was held at the Hotel Statler, Boston, Mass., February 19th and 20th, was attended by over 600 gas men, not only from New England territory, but from distant points as well. This attendance incidentally, was the largest ever enjoyed by the Association.

The meeting was called to order by J. J. Quinn, President, and after the reading of several reports, the past president, Mr. William Gould, presented the Governor's Cups for outstanding work in selling appliances. The Range Cup was awarded to the Ipswich Company, tank heaters also to Ipswich, room heaters to Nantucket, and the cup for the greatest percentage increase in domestic gas consumption was also won by Nantucket. Greenwich captured the cup for automatic water heater sales.

Mrs. Christine Frederick, Director Applecroft Home Experiment Station, New York, furnished the gas men with a fund of good thought in her paper, "Mrs. Consumer and Her Place in Gas Merchandising Policy." The entire assemblage gave Mrs. Frederick a rising vote of thanks for her excellent presentation.

"Liquefied Gases—An Asset or a Liability to the Industry" was read by A. M. Beebee. His thorough grasp of the subject, together with the timely discussion on the part of a number of prominent gas men, perhaps stamped this as the outstanding paper presented during the entire meeting.

President Mullaney of the American Gas Association complimented the New England Gas Association on its good work. He called attention to the fact that the efficient efforts on the part of the various gas associations for the past several years are rapidly creating a public awareness of the gas industry.

Mr. Mullaney spoke of the ability of the gas industry to cultivate new fields after losing the lighting load and mentioned the important part played by the association work during such transition. He also stated that the discussion of papers and points during any association meeting should be encouraged. Sales, said Mr. Mullaney, is one of the chief problems of the industry. Some additional points touched upon by him included a statement of the very good financial shape the industry is in and also its full grasp of engineering problems. He also called attention to the natural gas situation as affecting the gas situation in general and the new problems it brings with it. In concluding he advised that while the future looks encouraging, it must be borne in mind that it is generously besprinkled with problems.

Col. Oscar H. Fogg, past president of the Amcican Gas Association, spoke of the competition which looms along every avenue of future extension of the use of gas and said that not only good sales efforts are required, but there is also need for liberal expenditures for promotion work. He called for a careful study of rate structures and advised an orderly and logical growth of the business. He suggested that customers served at a loss must be made profitable by pushing the sale of the proper appliances and otherwise. Mr. Fogg said that we should spend the most money to get the most valuable business and that salesmen should be properly compensated.

As regards cooperative merchandising, he mentioned the good work done by his company in New York.

Other papers which were responsible for a considerable show of interest and discussion are as follows: "House Heating in its Most Recent Aspects," by Robert D. Stuart, Fall River Gas Works Company; "A Volume Price for Increased Business," by Philip Cabot, Harvard School of Business Administration; "Domestic Appliances and their Value in the Load," by Paul J. Naschold, New Haven Gas Light Company; "Progress of Pipe Joint Research," by K. R. Knapp, American Gas Association and "Practical Humanities in Public Utilities Relations," by Earl W. Hodges, Henry L. Doherty & Company.

The dinner and dance which were held on the evening of the first day were well attended and quite up to the usual standard.

The following officers were elected for the coming year President, H. Vittinghoff, First Vice-President, M. B. Webber, Second Vice-President, I. T. Haddock. Mr. F. B. Cadwallader is Treasurer and Mr. C. D. Williams, Executive Secretary.

Grand Junction, Colorado, To Get Natural Gas

The Fulton Petroleum Company of Seattle, Washington, which is to develop many by products from the natural gas already uncorked on the Garmesa dome in western Colorado, has been awarded a franchise to serve the city of Grand Junction with natural gas, the pipe line to be twenty-six miles long.

The Fulton company have started the erection of a plant for the manufacture of "Dioxice" which is a form of solid carbon dioxide, used in refrigeration and known as "dry ice." In extracting this chemical, there will also be produced about twelve sodium and magnesium compounds, commercial oxygen, ammonia, soda, magnesium carbonate, cardox or a coal mine explosive, liquid carbonic acid and a ferro-manganese product.

Meeting of Commercial Section Empire State Gas & Electric Association

A number of interesting papers were read before the meeting of the Commercial Section of the Empire State Gas & Electric Association, February 13th and 14th at Rochester, N. Y.

Mr. T. B. Federer in his paper "Keep Hot—Keep Clean, Hot Water, We Mean" discussed the sale of gas water heating and outlined several of the installment selling plans which have been used by his company.

"Factory Fuel Facts, Not Fancies," was read by R. L. Manier. In addition to many other interesting points brought out, Mr. Manier told how his company in Syracuse was able to sign up an industrial gas job on 80c gas that was a stand-off on coal at $5.00 per ton. He was of the opinion that Butane for industrial use was perhaps too valuable in its present condition. He also stated that Propane should be sold for less than Butane. During some of the subsequent discussions, Mr. Haftenkamp of Rochester called attention to the fact that the average family could not chew gum for less than 9c a day; yet the industry feels it is doing a lot when it sells such a family a few cents worth of gas in the same length of time. He stressed the return to the stockholders that the automatic water heater yielded.

In the absence of T. W. Halloran, his paper "Space Heating, Summer, All Year Round," was read by Mr. Skinner.

"Coke or Croak" by Mr. V. A. Miller was the concluding paper for the first day of the meeting.

On the afternoon of the second day, Mr. M. E. Skinner, New York Power & Light Corporation, presided at a merchandising policies symposium. This included the following subjects, "Installation Sales Costs," by Ernest Johnston, Syracuse Lighting Company, "Merchandising Policies" by Messrs. C. L. Law, New York Edison System, A. J. Peters, Consolidated Gas System, S. F. Hoefer, Associated Gas & Electric System and J. L. Haley, New York Power and Light Corporation. The concluding paper was by Hobart Benson entitled "New Thoughts for Gas and Electric Advertising."

A short paper of comments was read on the first day by Mr. Howley of the Brooklyn Union Gas Company, which touched upon gas refrigeration. He traced the trend of apartments in Brooklyn and discussed the increase in restaurants and canned goods. Mr. Howley said that many times an apartment house occupies the site of a former home which used more gas than the entire apartment house does. He called attention to the fact that 97% of the refrigerator load comes in off peak hours and he believes that the time is not far off when Brooklyn Union Gas Company will have 10% of its customers using gas refrigeration. He mentioned that the gas refrigerator takes the apartment house tenant out of the convenience class and puts him in the profitable class.

DIAMOND SPECIAL

CRAWFORD 16-441 L. H. T.

Walker & Pratt Mfg. Co., of Boston are celebrating their 75th Anniversary in Business. This beautifully enameled, fully insulated range is their offering to the trade, at a price that will enable your salesmen to close all prospects quickly.

WALKER & PRATT MFG. CO.

31-35 UNION ST., BOSTON

Mid-West Regional Gas Sales Conference Holds Meeting

The Mid-West Regional Gas Sales Conference was held at the Hotel Sherman, Chicago, Ill., February 13th and 14th. This meeting was sponsored by the Commercial Section of the American Gas Association and the attendance was about 500.

W. R. Evans, of the Peoples Gas Light & Coke Company, Chicago, and chairman of the Mid-West Regional Gas Sales Council, presided.

"Increasing Sales" was the title of the paper presented by Samuel Insull, Jr., of the Midland United Company. Mr. Insull discussed the need of meeting competition from electric utilities by practicable and attractive gas appliances.

T. P. Pfeiffer's paper dealing with promotion of sales by regional sales was productive of a great deal of discussion. Keith Clevenger of the American Gas Association pointed out among other things that the gas customer must constantly be kept informed of the benefits to be derived from Gas. Mr. Irving Tuteur, of the Public Utility Advertising Association, stated that regional advertising has many good points in its favor, but is not all that the industry needs to bring it on an equal footing with other industries, as regards prestige.

Mr. H. C. Haroldson, of the Allied Power & Light Corporation, read a paper entitled, "Selling Central Plant House Heating," in which he advocated gas-designed house heating furnaces as against conversion burners. Much discussion followed by Messrs. W. L. Jones of the St. Louis County Gas Company, Harold B. Johns of The Peoples Gas Light & Coke Company, Chicago and W. F. Miller of the Public Service Company of Northern Illinois.

Lyle C. Harvey of the Bryant Heater & Mfg. Company, spoke on "Cooperative Advertising."

"What A Sales Department Can Do for A Natural Gas Company," by Mr. Fred Karr of the St. Louis Gas Company, gave figures showing the increase in gas sales made by his company.

M. F. Heslip of the Public Service Company of Northern Indiana, voiced the opinion that specialty salesmen were needed to sell gas refrigeration. "Marketing Gas Refrigerators" was the title of his talk.

The following papers were read during the "symposium on selling." "Ranges," A. C. Murray, North Shore Gas Company, Waukegan, Ill., "Laundry Equipment," E. R. Felber, Madison, Wis., Gas & Electric Company, "Space Heaters," Geo R. Wilson, Rockford, Ill., Gas Light & Coke Company, "Incinerators," F. C. Hoffman, Northern States Power Company, St. Paul, Minn., "Group Appliance Selling," Jack Torbert, Wyandotte County Gas Company, Kansas City, Kan.

Stanley Jenks presented an interesting paper entitled, "Who is the Super-Salesman?" He brought out the fact that the gas business can't be so badly managed when it experienced a growth of 11 per cent last year and is planning to make a vast expenditure for improvements during the coming year. He mentioned an increase of 67 per cent in water heater sales and 72 per cent increase in removal of furnace coils made by his company last year, and told how it was done.

The concluding paper, "Large Volume Water Heating," was presented by C. H. Light of The Peoples Gas Light & Coke Company, Chicago, Ill. He used lantern slides of typical installations and charts to illustrate his talk.

C. A. Nash of the United Light & Power Engineering & Construction Company, Davenport, Iowa, was elected chairman for the coming year.

First Natural Regional Gas Sales Conference

(*Continued from page 88*)

In his paper, "Train for Dealer Cooperation in the Manufactured Gas Territory," Mr. A. J. Peters, Consolidated Gas Company of New York, stated that, "There can be no doubt that a careful, searching study of our present merchandising efforts will reveal that we have been sadly neglectful of the opportunities to increase our avenues of distribution for gas appliances. True, we have made attempts to do so in the past but because they were quite uniformly unsuccessful then, most of us have decided that it just simply cannot be done. However, a little reflection discloses that most of the conditions that worked against our success have either disappeared entirely or changed in aspect. The first and by far the most important change is that the modern plumber and steamfitter is either a merchandiser, or is taking steps to become one. The present day plumbers and steamfitters realize that they will never be successful business men as long as they sell nothing but labor. The process of bringing them to this realization has been a long, hard one and is largely due to the efforts of many national organizations. There has never been any doubt in my mind that the shops of these trades always were the logical places for certain of our appliances to be displayed and now that the consciousness of the merchandising element of their business is gaining such momentum it behooves us to solicit their cooperation before it is given to our competitors. And by our competitors I do not mean alone oil, coal, coke and electricity but also the manufacturers of the many articles that might be listed as indirect competitors of our services that these agencies could sell."

The final paper of the meeting "How Dealer Cooperation can be Obtained in Natural Gas Territories," by Mr. F. H. Stone, Equitable Gas Company, brought out that the matter was composed of three elements, "the utility represented by the right type of salesman, contractor who is greatly in need of this sales help and any reasonable plan from which both will secure a profitable return."

TRADE NEWS

United Engineers & Constructors, Inc., Activities

The Philadelphia Electric Company of Philadelphia, Pa., has awarded contract for the installation of necessary electrical equipment for controlling the operation of the gas compressors at the gas handling plant at West Conshohocken, Pa.

The Philadelphia Electric Company of Philadelphia, has given authority to furnish, deliver and install at their Chester, Pa., Plant, a motor driven gas compressor unit having a capacity of approximately 340,000 cu. ft. per hour at 100 pound pressure, with aftercooler, gas connections and electrical switching equipment.

The Philadelphia Electric Company, of Philadelphia, has authorized the installation of a gas engine driven gas compressor having a capacity of approximately 340,000 cu. ft. per hour at 100 pound pressure with all the necessary auxiliary equipment. A motor driven gas compressor of the same capacity is also being installed. These compressors are to be installed at the gas handling plant at West Conshohocken, Pa.

The Atlantic City Gas Company of Atlantic City, N. J., has contracted for the installation of a new washer tar batter with necessary castings and gas connections for one of the water gas sets at their plant in Atlantic City, N. J.

The Peoples Gas Company of Glassboro, N. J., have closed a contract covering the installation of a 9′ 0″ cone top, solid bottom generator, with the rolling type coal hole door, hinged grate, necessary castings and linings.

The Philadelphia Electric Company of Philadelphia, Pa., has given authority to furnish, deliver and install at their Tilghman Street Works, at Chester, Penna., an additional 9′ Internal diameter Mechanical Generator Set with waste heat boiler, and auxiliary gas handling equipment. This installation is an extension of the refinery oil gas reforming plant at Chester, whereby refinery oil gas secured from a nearby refinery.

(*Trade News continued on page 94*)

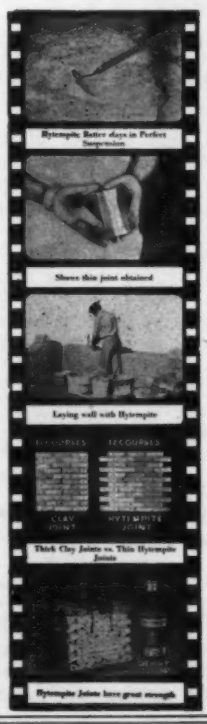
SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs

SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

Don't Figure Refractory Costs

on a basis of price per thousand or price per pound


Hytempite Better days in Perfect Suspension
Shows thin joint obtained
Laying wall with Hytempite
Thick Clay Joints vs. Thin Hytempite Joints
Hytempite Joints have great strength

When you buy or specify materials for furnace wall construction and repairs consider—

First, Quality and Long Life.

Second, Cost per year of service including all labor costs.

Good firebrick laid with fire clay or inferior bonding material is a poor investment. Fire clay is merely a filler and doesn't bond the brick.

Repairing Baffles with Quigley Refractory Gun (Patented)

HYTEMPITE

(Reg. U. S. Pat. Off.)

"The standard for comparison in high temperature cements." Makes thin, tight joints throughout the furnace wall. It resists destruction from constant vibration and allows furnace operation at high temperatures for long periods without frequent shutting down for repairs.

When repairs are necessary crushed old fire brick bonded with HYTEMPITE are used for hot or cold patching.

Rapid repairs to hot furnaces are made with the Quigley Refractory Gun.

Universally Used For

Linings in Generator, Carburetor and Superheater
Linings for Flues and Valves
Boiler Settings — Boiler Baffles — Cake Ovens
Gas Retorts — Gas Benches — Gas Producers
Special Shapes and Tile
Gas Fired Furnaces

QUIGLEY FURNACE SPECIALTIES COMPANY INC.

56 West 45th Street **New York**

REFRACTORY MATERIALS FOR FURNACE CONSTRUCTION AND MAINTENANCE
ACID PROOF CEMENTS — ACID AND ALKALI PROOF COATINGS

Stock and Service through Agents in Every Industrial Center

United Engineers & Constructors, Inc., Activities

(*Continued from Page 92*)

the gas having a B.t.u. value of approximately 1600 per cu. ft. and gravity of 1, is reformed into a gas having a B.t.u. value of 530 and a gravity of approximately .53, making it possible to use this gas as a base load gas interchangeable with coal gas.

The Concord, N. H., Gas Company, has given authority to design and later install a U. G. I. 4-pass high duty condenser, tar separator and auxiliary equipment for their plant.

The Jersey Central Power & Light Company of Asbury Park, N. J., have purchased 4,500,000 cu. ft. capacity per 24 hours, U. G. I. Tar Extractor, for their plant at Long Branch, N. J.

The Consumers Gas Company of Reading, Penna., has awarded contract for the installation of 6.5 miles of 12" welded steel main on the State Highway between Baumstown, Pa., and Berks County Line and one mile of 12" welded steel main in Reading, Penna. This work will be done by the Distribution Division of this company.

They have also awarded a contract for the installation of approximately 16,000 feet of 8" welded steel main and 10,000 feet of 2" galvanized main in Wolmensdorf, Penna., which work will be carried on by the Distribution Division of this company.

Attractive Gas-Incinerator Sales Plan

A comprehensive and very attractive sales plan has recently been inaugurated by the Kernit Incinerator Company, Ampere, New Jersey, to cooperate with utility and dealer outlets in making the public incinerator conscious.

A complete portfolio, consisting of three units is being presented by the Kernit salesmen to Kernit utility and appliance dealer outlets and prospective outlets. These units explain the many angles of incinerator merchandising. Every phase of the entire plan is interestingly outlined. Salesmen are thus given the opportunity of getting a proper background in selling incinerators, new ideas in their presentation are suggested, the many classes of prospective incinerator prospects are pointed out, sales plan and campaigns are carefully outlined, etc.

The bulletin entitled, "Kernit Sales Plan for Gas Companies and Dealers" outlines in detail suggested procedure for effectively putting into operation a definite sales program for gas-fired incinerators. Herein is set forth the manner in which the Kernit Incinerator Company and its agencies throughout the country are prepared to render personal service to gas companies and appliance dealers. It contains pertinent paragraphs on instruction of salesmen; load building; list prices and terms, the best prospects for incinerators; cooperation of local dealers with gas companies; cooperation of Home Service Department of Gas Companies; newspaper and local advertising; installations and inspections, etc. It also contains a list of Kernit agents. There is a page of photographs of typical window and floor displays.

"Your Next Move" is the title of one of the portfolios, which contains complete information in text and illustrations of the Kernit features of construction and operation. It also contains a list of questions and answers on the incinerator.

The portfolio called "A Golden Opportunity" contains complete information as to the direct-mail literature and other advertising helps the Kernit Company are prepared to furnish, together with tipped in copies of all Kernit literature which will be furnished with the gas company or dealer named imprinted. Stickers handy to use in mailing bills, statements, etc.; stuffers; attractive pieces for counter distribution; letter suggestions, practical newspaper advertising and display cards are included. Mats are supplied for the newspaper advertisements when requested.

A complete portfolio containing the above bulletins will be sent to interested parties by the Kernit Incinerator Company.

Bristol Co. Open New Sales Office

The Bristol Co., Waterbury, Conn., recently opened a new sales and service office in Los Angeles, California. Mr. S. W. Case has been appointed District Manager, and Mr. W. H. Rogers, Sales and Service Engineer. Both of these men are capable engineers and have a background of several years' experience in the use of Recording, Indicating and Control Instruments, particularly as applied to industrial applications.

Western Gas Finishes Reorganization Plans

The Western Gas Construction Company has completed its organization plans under the management of the Bartlett-Hayward Company of Baltimore, Md., it is announced. Changes affecting the local management include the appointments of E. R. Hall as vice-president and general manager and W. C. Burggraf as general superintendent.

The recent acquisition of control of the Western Gas Construction Company by the Bartlett-Hayward Company, a subsidiary of the Koppers Company, was made to improve operating results.

Mr. Burggraf came here from Baltimore, where he was associated with the Koppers' subsidiary there. The Bartlett-Hayward Company was organized in 1832, and since 1876 has led in the manufacture of machinery for production of illuminating gas. The concern has designed and constructed some of the largest gas plants in the world.

Bryant Company Elects New President

Mr. J. E. Kinner was elected President of The Bryant Heater & Mfg. Company, Cleveland, Ohio, at the recent meeting of stockholders of that company.

Mr. Kinner is one of the pioneers in the field of Automatic Gas Heating, having been associated with the Bryant Company for 15 years.

He is well known in gas circles, particularly in the East, where his activities as Bryant's Eastern District Sales Manager have won for him a wide circle of friends in the industry.

Changes in Officials of The Connersville Blower Company, Inc.

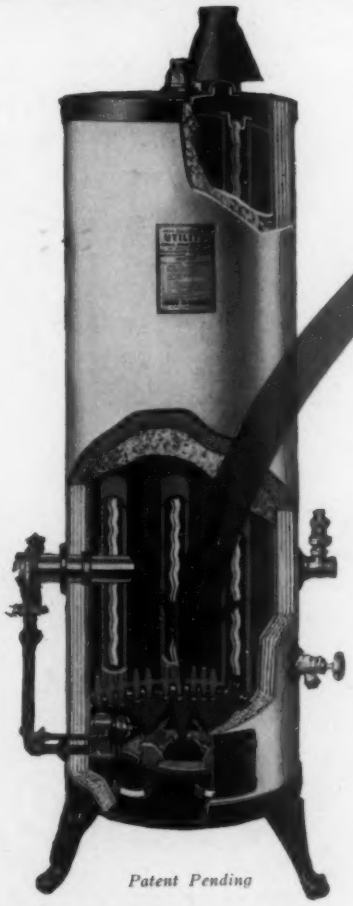
At a recent meeting of the board of directors of The Connersville Blower Company, Inc., John T. Wilkin, president and chief engineer, was chosen as general manager, also. At the same time, Bernard C. O'Brien, formerly in charge of sales in Pittsburgh, was elected secretary; W. E. Newkirk, purchasing agent, became treasurer, and E. C. Hassler, assistant superintendent, was appointed acting superintendent. The last three selections were to fill vacancies due to the deaths of J. E. Huston, secretary-treasurer, and R. T. Huston, vice-president and superintendent.

Schawalder Transferred to Los Angeles Branch

Allen Schawalder, formerly a member of the research engineering department of The Pittsburgh Equitable Meter Company, has been transferred to the branch factory in Los Angeles. Here he will have charge of the service engineering department.

More Hot Water per foot of gas by

HEAT CONDUCTORS



Patent Pending

IT IS A SIMPLE STORY

that the Salesman can tell with Confidence and Conviction.

HEAT CONDUCTORS

A New Principle applied to water heating used exclusively in

UTILITY

Automatic Storage Gas Water Heaters

RESULT: 84 to 88 percent efficiency produced by the Heat Conductors. They transfer the heat of the gas flame rapidly to the water in the bottom of the tank. Only 1½ feet of manufactured gas per gallon of water heated.

The Engineer sees at a glance why the UTILITY produces this high efficiency.

Additional aids to the rapid heating of the water are the Heating Flues, through which pass the burnt gases.

UTILITY delivers the absolute maximum of Hot Water Satisfaction.

Sales Helps

Attractive Folders that tell a convincing story for consumer distribution.

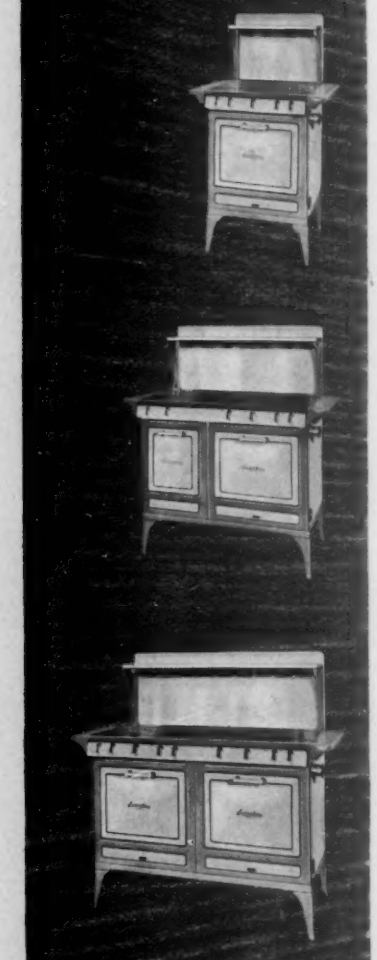
Campaign Suggestions and Newspaper Mats.

A request on your letterhead will bring further information and prices

F. G. CORBUS

261 N. Broad Street Philadelphia, Pa.

More profits for you...from



A size for every kitchen and every cooking need

No Competition

... The 1930 Smoothtop Gas Range is the only gas range of its kind on the market . . . a new, fast-growing market in itself.

Longer Profit

. . . Smoothtop is the outstanding gas range specialty—and carries a specialty profit. You make more money on every Smoothtop sold.

National Advertising

... A great national magazine advertising campaign will carry Smoothtop's slogan "Captures the flavor . . . frees the cook" to millions of women. This slogan has a real sales-making meaning to housewives right in your town.

Complete Sales Cooperation

. . . When you take on Smoothtop, your salesmen can receive special free training in the most up-to-date retail and house-to-house salesmanship. You get local newspaper advertising helps, floor displays, window displays, and cooking schools. This complete sales-training program will rapidly turn Smoothtop profits into your cash drawer.

Exclusive Territory

. . . Once you're carrying Smoothtop, you become the only Smoothtop dealer in your territory. Act while territory is open.

Write for complete merchandising set-up

. . . to Standard Gas Equipment Corporation . . . 18 East 41st Street, New York City. Makers of . . . Smoothtop . . . Oriole . . . Vulcan . . . the standard domestic and heavy-duty gas ranges wherever gas is used. Pacific Coast Distributor: Northwest Gas & Electric Equipment Co., Portland, San Francisco, Los Angeles.

Smoothtop

GAS RANGE

CAPTURES THE FLAVOR . . . FREES THE COOK

Smoothtop's new cooking ease

Cooks a whole meal around one burner. Note space on big cooking top at convenient height.

Its smooth, flat top lets pots slide easily. Smallest pots will not tip or spill. Very easy to keep clean.

Heat from one of its burners keeps the whole meal steaming hot while waiting to be served.

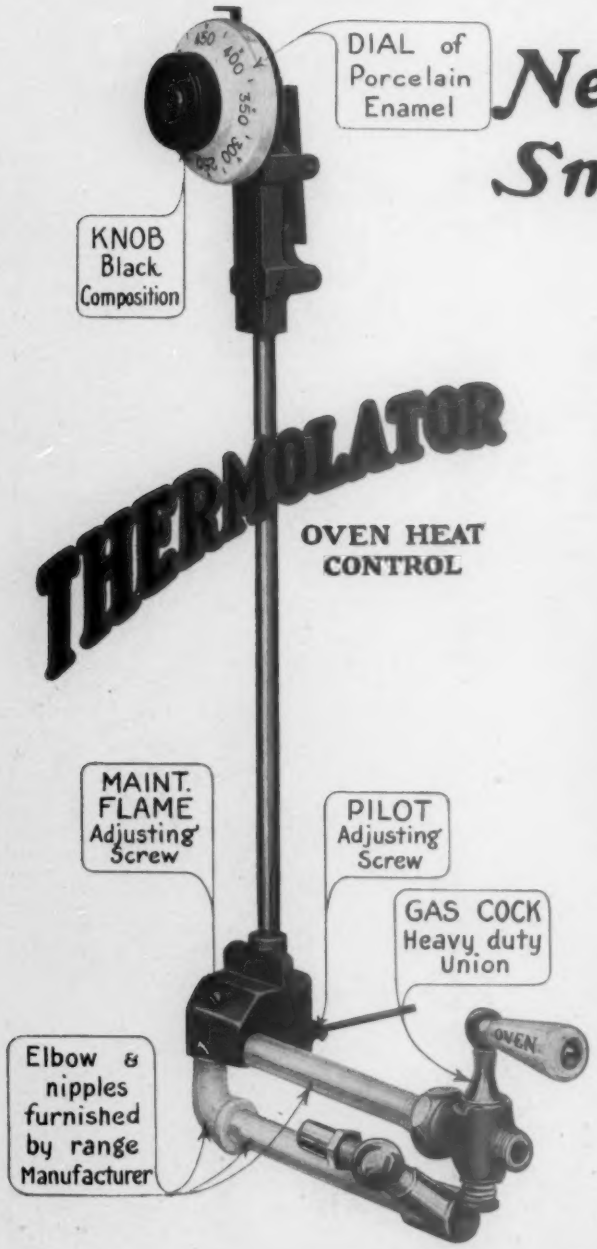
NO other range offers features as attractive; 4 definite heat zones... speed-spots, busy-boiling, simmering and warming zones; a broad top with every square inch actual cooking surface; evenly heated oven, heat regulator and time chart; automatic self-lighting burners; insulated oven optional.

Smoothtop

GAS RANGE

CAPTURES THE FLAVOR . . . FREES THE COOK

ALWAYS UNIFORM TEMPERATURE



New Design Smashes Records!

IT is now possible for a gas range manufacturer to offer oven-heat-control ranges on a 100% performance basis.

The new **THERMOLATOR,** a splasher dial mounted control of the concealed type, distinctive and unique in every respect, low in initial cost, low in installation cost, and high in uniformity of performance, has solved the problem.

A manufacturer of quality products cannot afford to pass by the opportunity of advancing his price and performance position through the advantages we have made available.

Made and Guaranteed by

CLAUS MANUFACTURING CO.

Subsidiary of Milwaukee Gas Specialty Company

MILWAUKEE, WISCONSIN

AVAILABLE ON ALL GAS RANGES

EVERY MONTH MILLIONS OF MAGAZINE READERS LEARN ABOUT IDEAL GAS BOILERS

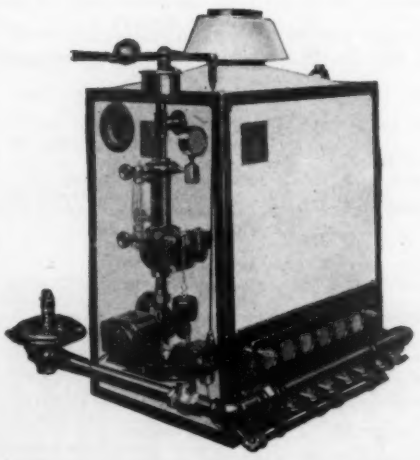
WHY

AMERICAN RADIATOR COMPANY

manufactures

IDEAL GAS BOILERS

AUTOMATIC heating that is really automatic, has come to stay. Realizing this, the largest manufacturer of heating equipment in the world has developed Gas Boilers that are the last word in efficiency. In the general heating field, products of this company have long been the standard by which others are judged. And now Ideal Gas Boilers occupy that same enviable position.



manufactured by
AMERICAN RADIATOR COMPANY
sold by
AMERICAN GAS PRODUCTS CORPORATION
Chrysler Building, New York

EVERY MONTH MILLIONS OF MAGAZINE READERS LEARN ABOUT IDEAL GAS BOILERS

HOW TO USE THE GOODMAN STOPPER

Four Easy Steps!

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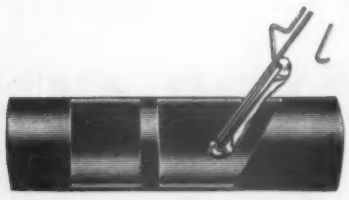
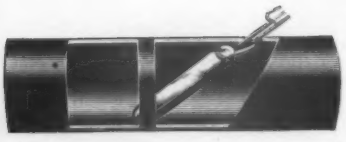
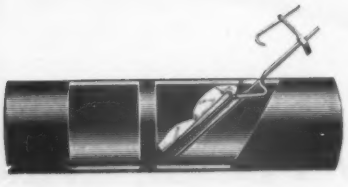


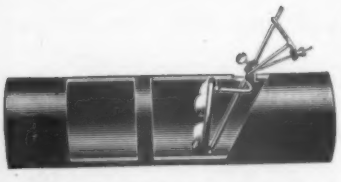
TURN TO RIGHT LIKE THIS



ENGAGE Z HANDLE IN TAPPING. PULL LONG HANDLE TO YOU



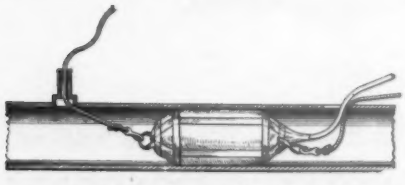
LOWER LOCKING SLEEVE AND LOCK IN PLACE LIKE THIS



WHEN LOCKED IN PLACE IT HOLDS

TYPE "C"

CANVAS COVERED GAS MAIN BAGS



CYLINDRICAL BAGS

Safety Gas Main Stopper Co.

523 ATLANTIC AVENUE, BROOKLYN, N. Y.

Cable Address: Gastopper, N. Y.

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Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 108.

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JANITROL Sales Increase 120% in 1929

This acceptance of JANITROL proves it to be a practical and profitable means of educating home owners to the advantages of gas as a fuel.

JANITROL does give satisfaction. It is not merely a conversion burner, but a carefully developed, correctly engineered, thoroughly tested, rightly built, fully automatic gas burning unit on which more than *twenty thousand home owners* and *one hundred thirty gas companies* have placed their stamp of approval. Therefore, its acceptance in your territory is merely a matter of acquainting home owners with JANITROL and its many benefits.

In a few years, every JANITROL user is ready to buy a complete gas fired job, because heating plants, however good, do become obsolete. And by that time the cleanliness, comfort and convenience of gas as a fuel, have become so essential that the change to complete gas fired equipment is but a matter of course.

Now, that is the mission of JANITROL—to create a more general acceptance of gas as a fuel,—to build up a future demand for complete installations of gas fired equipment, and to make every domestic meter a profit producer for you.

Right now, folks are tired of shoveling coal—it is the time to push up the profit line with JANITROL. We will help you do this. Write for the *Spring Merchandising Plans.*

The Surface Combustion Co.
INCORPORATED
Subsidiary of Henry L. Doherty & Co.
2375 DORR STREET, TOLEDO, OHIO
Branch Offices in All Principal Cities
Mantle Recuperator Division
METALLIC RECUPERATORS
Webster Engineering Co.
WEBSTER BOILER BURNERS
Member of Industrial Furnace Manufacturers Association

Traffic is never delayed when ARMCO corrugated pipe *is Jacked through*

ECONOMIZE all around! Save the great expense of broken-down pavements, property damages, and traffic delays resulting from obsolete construction methods. Armco Corrugated Iron Pipe *jacked through*, is the method of making the most successful installation within municipalities at the minimum outlay, in the shortest time.

Besides assuring uninterrupted traffic and safeguarding property with the Armco Jacking Method, Armco Corrugated Pipe itself is assurance of many years of uninterrupted service . . . Armco Ingot Iron is the one metal which has served continuously for 24 years, enduring every condition of soil, water and pressure. No other metal of its type approaches Armco durability in "Nature's laboratory"—under the ground.

Public Utility and Gas companies know the advantages of the Armco Jacking Method, using Armco Corrugated Pipe. By its use they save many thousands of dollars annually for themselves and the railroads under whose tracks they lay conduits. The story of Armco jacking is told in a booklet, sent for the asking. Write.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand.

Armco Culvert Manufacturers Association

Middletown, Ohio

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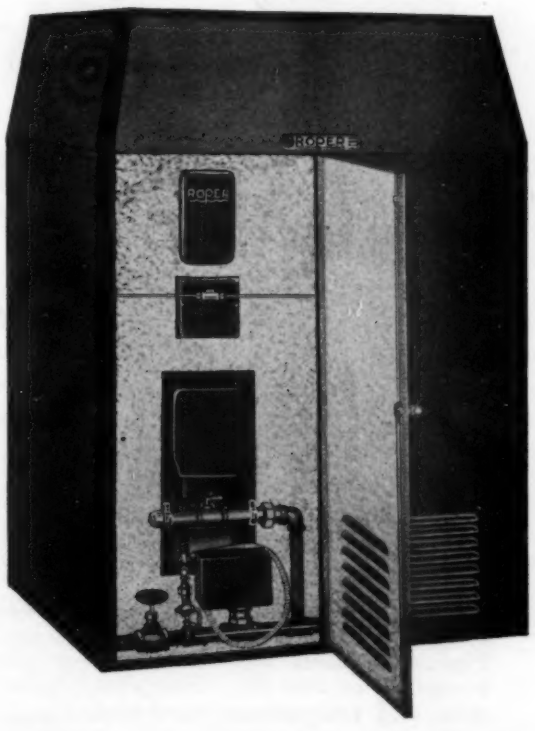
DOMINANT

IN A DAY

The New

ROPER

GAS FURNACES



A new, beautiful and thoroughly modern gas fired warm air furnace is winning instant approval over the entire country.

It is a Roper product—the result of years of furnace manufacturing experience and a thorough study of house heating problems.

Made in all sizes on the single unit to a battery plan, it is adaptable to every size of job, from a small residence to a large building.

The Roper Gas Furnace is safe, an automatic thermostat heat control shutting off the heat at a predetermined temperature.

It can be furnished with or without thermostatic control, automatic humidifier, safety pilot, limit control and fan, etc.

It is of heavy cast-iron construction, and AGA approved.

In short, the new Roper is a product that the Gas Industry can unreservedly recommend.

GEO. D. ROPER CORPORATION
Rockford, Illinois

SPECIFICATIONS

Roper Furnace	Net Available B.T.U. Per Hour at Bonnett	Free Area Thru Furnace (Sq. In.)	Imput Rating B.T.U.'s Per Hour	Number Burners	(Diam. In.) Flue Vent Sizes	Dimensions-Inches Width	Depth	Height
4001	57,500	565	75,000	1	5	22	*44¼	64¾
4002	115,000	1,022	150,000	2	7	44	*40¼	64¾
4003	172,500	1,533	225,000	3	9	66	*40¼	64¾
4004	230,000	2,044	300,000	4	—	88	*40¼	64¾
4005	287,500	2,555	375,000	5	—	110	*40¼	64¾
4006	345,000	3,066	450,000	6	—	132	*40¼	64¾

*Down Draft Diverter adds approximately 18 inches to the depth.

Roper Furnaces 4,001, 4,002, 4,003, 4,004, 4,005, 4,006 are fitted for manual control—regularly equipped with main shut off valve and Bunsen flame pilot. These furnaces can also be furnished with thermostatic control, automatic humidifier, safety pilot, limit control and fan. Finished in either plain galvanized and black or Crystal Green and black.

You Can't Laugh off Leaks

But with McWANE Joints and Pipe You Can STOP THEM!

McWane Screw-joint Gas Pipe tested to destruction, the location of the break proving the threaded joint even stronger than the pipe itself.

HERE is a threaded-joint pipe without couplings and that CAN'T rust out. Pipe and joints recommended for gas pressures to 100 lbs. Simplicity, economy, and permanence combined.

The pictures tell the rest—how you lay it by merely screwing spigots into bells, using joint compound. Joints have over-sized threads and are even stronger than pipe itself.

Get details regarding fittings, expansion joints, prices TODAY.

Sizes: Screw joints, 1¼ thru 8" B. & S. or plain ends, 1¼ thru 12"

McWANE CAST IRON PIPE CO.

Birmingham - Philadelphia - Chicago - Dallas
PACIFIC STATES CAST IRON PIPE COMPANY
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For Complete Safety for STORAGE HEATERS .....this Proved SAFETY PILOT!

The No. 730 Safety Pilot — an exclusive, *patented* Time-O-Stat product.

THE outstanding dependability and safety of the Time-O-Stat No. 730 Storage Water Heater Safety Pilots has won recognition throughout the gas industry. This pilot controls the flow of gas to the main burner. In the event of flame failure, the pilot shuts off the main gas supply.

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Our engineering department is always at your service to work out any individual control problem.

For full information on these products—write or wire today!

TIME-O-STAT AUTOMATIC CONTROLS

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ELKHART, INDIANA

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Sensitive
GAS GOVERNOR

for high pressure transmission

This governor is designed to meet the needs of artificial and natural gas companies who desire to control a high and varying inlet pressure and reduce it to a low and unvarying outlet pressure, for illuminating or fuel purposes.

The materials used in its construction are resistant to the chemical action of all manufactured gases; all frictional surfaces are eliminated, and the diaphragm surface is increased by the use of two diaphragms, thus giving it vastly greater sensitiveness and power over governors equipped with but one diaphragm.

The Fulton Gas Governor is easily and quickly installed and requires a minimum of attention afterward.

Write for complete Catalogue

The Chaplin-Fulton Mfg. Co.

28-40 Penn Ave. Pittsburgh, Pa.

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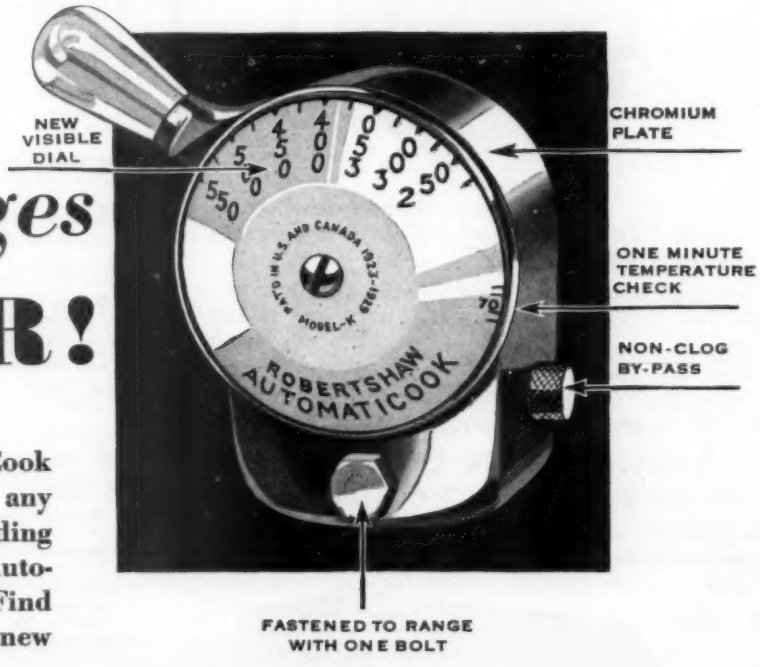
The NEW "K" *Type* AutomatiCook *is selling Gas Ranges* FASTER!



THE new "K" Type AutomatiCook is a definite selling point on any range. And more than 100 leading makes of gas ranges will be AutomatiCook equipped this year. Find out the selling arguments of the new AutomatiCook—*now!*

It's smaller, more compact, better looking. Chromium plated. A full vision dial. An absolutely foolproof One-Minute Temperature Check. A non-clog by-pass. Only *one* bolt secures the AutomatiCook to the range. The AutomatiCook is so designed that temperature setting, calibrating and all working parts are accessible from outside the range.

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ROBERTSHAW AutomatiCook

ROBERTSHAW THERMOSTAT COMPANY
Youngwood, Penna.

CLARK INDUSTRIAL BURNER TIPS

(Patented)

Endurance, dependability and adaptability insure the adoption of lava tips in low pressure fan blast systems.

Adapted to specific needs, these tips are employed in varied industries where gas is the fuel.

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We Invite Correspondence

American Lava Corporation

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Manufacturers of Lava Tips & Heat Resistant Insulators

The MEEK REEL GAS OVEN

CONSTANT, uniform motion, combined with proper heat distribution, assures a thorough and even bake, for all baking operations. Eight distinctive advantages make McDonald-made, Meek Reel Ovens the choice of thousands of bakers all over the world for the past quarter of a century. Let us solve your baking problems. Complete information on request.

THE BRUCE McDONALD CO.

2015 Washington St. Kansas City, Mo.

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EDITOR, AMERICAN GAS JOURNAL, 53 PARK PLACE, NEW YORK

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ONE SPECIAL SALESMAN for Electrolux can greatly increase the domestic load.

ELECTROLUX

THE *Gas* REFRIGERATOR

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The Brown Instrument Co.
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The P. H. & F. M. Roots Company.
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CHARGING MACHINERY
Bartlett-Hayward Co.
The Gas Machinery Co.
Improved Equipment-Russell Engineering Corp.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.

CHUTES
C. W. Hunt Co., Inc.
Riter-Conley Company.
Robins Conveying Belt Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.

CLAMPS (PIPE)
S. R. Dresser Mfg. Co.

CLOCKS & WATCHES, Stop
American Meter Co.

COALS
Boone County Coal Corpn.

COAL GAS APPARATUS
Bartlett-Hayward Co.
Indugas, Inc.
The Gas Machinery Co.
Improved Equipment-Russell Engineering Corp.
Isbell-Porter Company.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Company
The Western Gas Construction Company.

COAL & COKE BINS CASTINGS
The Koppers Construction Co.
The Stacey Mfg. Co.
The Western Gas Construction Co.

COAL AND COKE HANDLING MACHINERY
Bartlett-Hayward Co.
Dry Quenching Equipment Corp.
C. W. Hunt Co., Inc.
Isbell-Porter Company.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
United Engineers & Constructors, Inc.

COAL TAR PRODUCTS
International Combustion, Tar, and Chemical Corpn.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.

COAL TUBES
C. W. Hunt Co., Inc.
Meter
Superior Meter Co.

COKE CRUSHERS
The Koppers Construction Co.

COKE QUENCHING
Dry Quenching Equipment Corp.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.

COKE RECLAMATION SYSTEMS
C. W. Hunt Co., Inc.

COMPUTERS
Heating Value
United Engineers & Constructors, Inc.

CONDENSERS
Andale Co.
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Co.
The Gas Machinery Co.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
The Western Gas Construction Company.
High Duty
Stacey Bros. Gas Const. Co
United Engineers & Constructors, Inc
Wolverine Tube Co.

CONTRACTORS' TUBS
C. W. Hunt Co., Inc.

CONTROLS
The Bristol Company.
The Brown Instrument Co.
Robertshaw Thermostat Co.
Time-O-Stat Controls Co.
Combustion
Smoot Engineering Corp.
Gas Pressure
Smoot Engineering Corp.
Gas Producer
Smoot Engineering Corp.
Water Gas Machine
Smoot Engineering Corp.

CONVEYORS
C. W. Hunt Co., Inc.
Isbell-Porter Company.
The Koppers Construction Co.

CONVERSION UNITS
Roberts Gordon Appliance Corpn.

COOLERS
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.
Air
Andale Company.
Ammonia Liquor
Andale Company.
Gas
Andale Company.
Oil
Andale Company
WATER TO WATER
Audale Company

COOLING COILS
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.

COUPLINGS
Bartlett-Hayward Co.
S. R. Dresser Mfg. Co.
National Tube Co.
Pittsburgh Equitable Meter Co.
The P. H. & F. M. Roots Company.
Victaulic Co. of Amer.

COUPLINGS—FLEXIBLE
The P. H. & F. M. Roots Company.

CUBIC FOOT BOTTLES
American Meter Co.
Lambert Meter Co.

CUTTING APPARATUS & SUPPLIES
Union Carbide & Carbon Co.

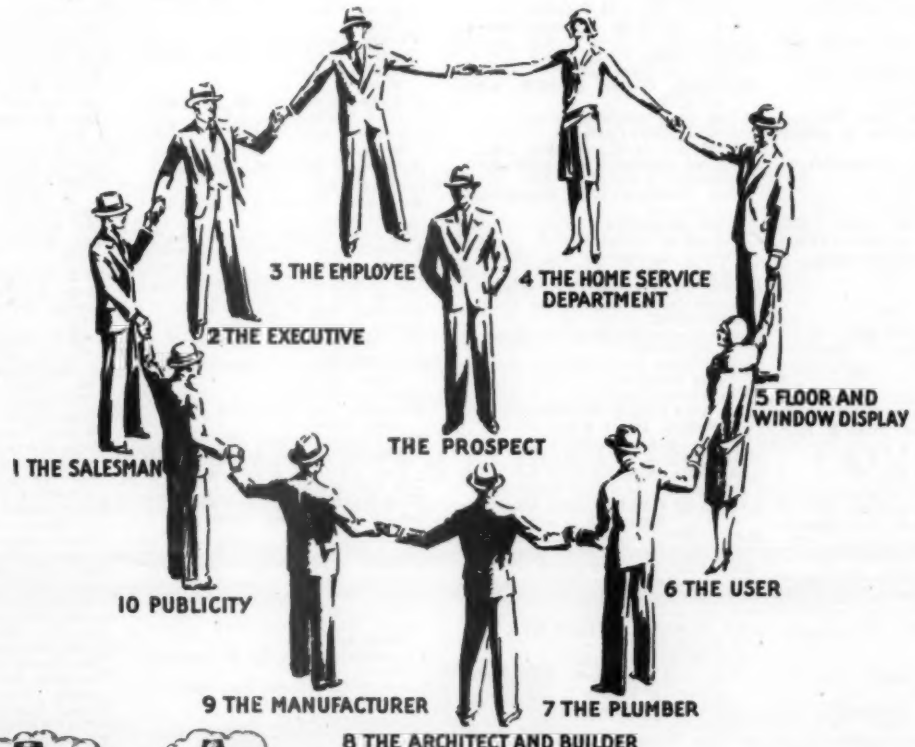
CRUSHERS
Riter-Conley Company.

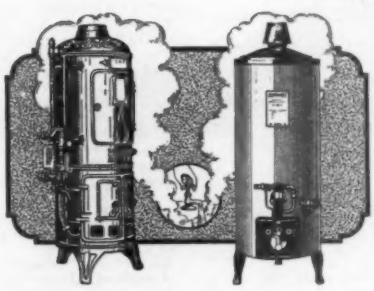
DE-EMULSIFIERS
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.

DEHYDRATORS, GAS
Andale Company.

SELLING

is an organization responsibility





THE RUUD $95 TWINS

Two popular leaders of the RUUD Quality Line that consists of a hundred types, sizes and combinations.

Talk about sales—use high-sounding phrases if you will—make charts and draw diagrams and this fact remains as fundamental: You must find and sell the PROSPECT!

If he doesn't believe that hot water is a vital service that should be supplied in modern fashion, you'll never sell him an automatic water heater even if you price them at a dime a dozen.

The TEN TO ONE plan is built around your organization as a unit. It sells HOT WATER first,—then the quality machine that supplies it.

RUUD MANUFACTURING COMPANY
Pittsburgh, Pa.

Toronto **Hamburg** **London**

RUUD QUALITY

Buyers' Reference Index

See page 121 for advertisements of these products

Semet-Solvay Engineering Corp.
West Gas Improvement Co.
The Western Gas Construction Company.

DEMONSTRATION METERS
American Meter Co.
Lambert Meter Co.

DIAPHRAGMS (Meter)
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
American Meter Co.

DISCHARGING MACHINERY
Bartlett-Hayward Co.
Improved Equipment-Russell Engineering Corp.
Semet-Solvay Engineering Corp.

DRAFT GAUGES
The Bristol Company
Brown Instrument Co., The
Precision Thermometer & Instrument Company.
Taylor Instrument Companies.

DRYERS (Laundry)
Judelson Dryer Corpn.
W. E. Lamneck Co.

DUPLEX HEATING SYSTEMS
Roberts-Gordon Appliance Corpn.

ELECTRIC LOCOMOTIVES
C. W. Hunt Co., Inc.

ELEVATORS
C. W. Hunt Co., Inc.

ENGINE INDICATORS
Consolidated Ashcroft Hancock Co., Inc.

ENGINEERS
American Meter Co.
The Gas Machinery Co.
Southwestern Pipe Joint & Eng. Co.
Combustion
Bartlett-Hayward Co.
The C. M. Kemp Mfg. Co.
Smoot Engineering Corp.
United Engineers & Constructors, Inc.
Consulting
Bartlett-Hayward Co.
Edw. A. Dieterle
United Engineers & Constructors, Inc.
The Western Gas Construction Company.
Contracting
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Company.
C. W. Hunt Co., Inc.

IMPROVED EQUIPMENT
Russell Engineering Corpn.
Isbell-Porter Company.
Riter-Conley Company.
Stacey Bros. Gas Const. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company.
Distribution
United Engineers & Constructors, Inc.
Measurement
American Meter Co.
Connersville Blower Co.

EXHAUSTERS
Connersville Blower Co., The
The Gas Machinery Co.
Isbell-Porter Company.
The P. H. & F. M. Roots Company.
The Western Gas Construction Company

EXPANSION BENDS
The Gas Machinery Co.
Semet-Solvay Engineering Corp.

FILES (Steel and Wood)
Remington Rand, Inc.

FILES (Visible)
Remington Rand, Inc.

FILTERS, Gas
American Meter Co.

FIREBRICK, CEMENT
General Refractories Co.
Quigley Furnace Specialties Co., Inc.
Refractory & Engineering Corp.

FIREBRICK CHECKER BRICK (See Brick)
The Gas Machinery Co.
General Refractories Co.
Improved Equipment-Russell Engineering Corp.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

FIRST AID EQUIPMENT
United Engineers & Constructors, Inc.

FITTINGS
S R Dresser Mfg. Co.
Isbell-Porter Company.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
U. S. Cast Iron Pipe and Foundry Co.
The Western Gas Construction Company.
Plain End and Flanged
Cast Iron Pipe Research Association.

FIXTURES
American Lava Corp.

FLOORS, IRON, BRICK, AND STEEL
The Gas Machinery Co.
Riter-Conley Company.
Semet-Solvay Engineering Corp.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

FLOW METERS
American Meter Co.
Brown Instrument Co., The
Lambert Meter Co.

FLUE PIPE (Cast Iron Oval)
Semet-Solvay Engineering Corp.

FURNACES
Combustion Engineering Corpn.
Gas Fired
Geo. D. Roper Corp.
Gas Soldering
American Meter Co.

GAS ANALYSIS APPARATUS
American Meter Co.
Metric Metal Works.

GASKETS
American Meter Co.
Pittsburgh Equitable Meter Co.
Reynold Gas Regulator Co.
Superior Meter Co.

GAS COAL
Boone County Coal Corpn.

GAS MAIN CONDUITS
Armco Culvert Manufacturers Assn.

GASOMETERS (Test)
American Meter Co.

GAS PLANTS, COMPLETE
Indugas, Inc.
Gas Engineering Co.
Improved Equipment-Russell Engineering Corpn.
Isbell-Porter Company.
Philfuels Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Co.

GAS SCREEN
Connelly Iron Sponge & Governor Co.

GASSING MACHINE
American Meter Co.
Lambert Meter Co.
Superior Meter Co.

GAS TAPE
Connelly Iron Sponge & Governor Co.

GAS TESTING APPARATUS
American Meter Co.
Metric Metal Works.

GATE VALVES (See Valves)

GATES—WIND & BLAST
The P. H. & F. M. Roots Company
The Western Gas Construction Co.

GAUGE BOARDS
The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
United Engineers & Constructors Inc.
The Western Gas Construction Company.

GAUGES
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
The P. H. & F. M. Roots Company.
Superior Meter Co.
Taylor Instrument Companies.
The Western Gas Construction Company.
Mercury
Precision Thermometer & Instrument Company.
Pressure-Recording
American Meter Co.
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Siphon
Precision Thermometer & Instrument Company.
Tank
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Water
Precision Thermometer & Instrument Company.

GLOVES
Rubber
Safety Gas Main Stopper Co.

GOVERNORS
Pittsburgh Equitable Meter Co.
Automatic
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Gas Industries Laboratories.
Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.

GOVERNORS (Calorimeter and Double Dry)
American Meter Co.
Reynolds Gas Regulator Co.
Coke Oven
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
District
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Isbell-Porter Co.
Smoot Engineering Corp.
Exhauster
Connelly Iron Sponge & Governor Co.
Connersville Blower Co., The
The Gas Machinery Co.
Isbell-Porter Co.
The P. H. & F. M. Roots Company.
Smoot Engineering Corp.
High Pressure
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.
Laboratory
American Meter Co.
Connelly Iron Sponge & Governor Co.
Lambert Meter Co.
D. McDonald & Co.
Reynolds Gas Regulator Co.
Low Pressure
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Lambert Meter Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.
Retort House
Isbell-Porter Company.
Station

GRATES for Water Gas Generators
Semet-Solvay Engineering Corp.
The Western Gas Construction Co.

GRAVITOMETERS
Precision Thermometer & Instrument Company.

GRIDS, for Scrubbers
Semet-Solvay Engineering Corp.
The Western Gas Construction Co.

GUN-REFRACTORY
Quigley Furnace Specialties Co.

HEATERS
Feed Water
Andale Company.
For Oil
Andale Co.
American Gas Products Corp.
American Stove Company.
Homestead Heater Company.
Kompak Company.
Roberts-Gordon Appliance Corpn.
Welsbach Company.
Welsbach Company.

HIGH CAPACITY METERS
Lambert Meter Co.

HOISTS
The Gas Machinery Co.
C. W. Hunt Co., Inc.
The Western Gas Construction Co.

HOLDERS
Bartlett-Hayward Co.
Cruse-Kemper Co.
Gas Engineering Co.
Riter-Conley Company.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
The Western Gas Construction Co.

HOPPERS—COAL AND COKE
Bartlett-Hayward Co.
Cruse-Kemper Co.
C. W. Hunt Co., Inc.
Riter-Conley Company.
The Stacey Mfg. Co
The Western Gas Construction Co.

HIGH PRESSURE STORAGE
Cruse Kemper Co.
Stacey Bros. Gas Construction Co.
Stacey Mfg. Co.

HOWARD AUTOMATIC CHARGERS
The Western Gas Construction Company.

HYDROGEN GAS APPARATUS
Bartlett-Hayward Co.
Cruse Kemper Co.
Gas Engineering Co.
Improved Equipment-Russell Engineering Corp.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc
The Western Gas Construction Co.

HYDROGEN SULPHITE TEST (Apparatus)
American Meter Co.

HYDROMETERS
The Brown Instrument Co.
Precision Thermometer & Instrument Company.
Taylor Instrument Companies.

INCINERATORS, GAS-FIRED
Kernit Incinerator Co.

INDUSTRIAL GAS MIXERS
The C. M. Kemp Mfg. Co
Roberts-Gordon Appliance Co.
Smoot Engineering Corp.

INDUSTRIAL TRACK
C. W. Hunt Co., Inc.

IRON BORING OXIDE
Gas Purifying Materials Co., Inc

IRON SPONGE
Connelly Iron Sponge & Governor Co.

IRONERS (Gas Heated)
Hurley Machine Company.

INSTRUMENTS
Alpha-Lux Company.
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Lambert Meter Co.
Metric Metal Works.
Precision Thermometer & Instrument Company.
Taylor Instrument Companies.
Time-O-Stat Controls Co.

INSULATION
Insulating Cements
Refractory & Engineering Corpn.

PACKING FIBRE
Refractory & Engineering Corpn.

PENTANE
Philfuels Co.

PROPANE
Philfuels Co.

JOINTS (Pipe)
S. R. Dresser Mfg. Co.
Southwestern Pipe Joint & Eng. Co.
United States Pipe & Foundry Co.
Insulating
United Engineers & Constructors, Inc.
Victaulic Co. of Amer.

JOINT RUNNERS
Safety Gas Main Stopper Co.

LAUNDRY STOVES
Geo. D. Roper Corp.

BAROMETERS

PHILADELPHIA, THE WORKSHOP OF THE WORLD
has 14,000 Manufacturing Establishments of which many have World-Wide Reputations.

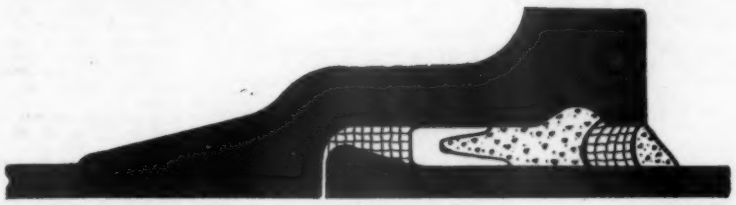
"PRINCO" STANDARD FORTIN MERCURIAL BAROMETERS

are in World-Wide use because they, too, have a "World-Wide Reputation"

THEY ARE GOOD BAROMETERS
THEY ARE REASONABLE IN PRICE!

For more than a decade they have been made in such manner that they can be shipped safely and successfully wherever there is a common carrier. This has been recognized as an achievement in Barometry.

PRECISION THERMOMETER & INSTRUMENT COMPANY
1439 BRANDYWINE STREET - - - - - PHILADELPHIA, PA.



Style 900 Braided Jute
Southwestern Ring
Cement or Calking Lead

Joints As Permanent As Cast Iron Pipe

For New Mains or Repairing Old Joints

WRITE FOR SAMPLE MATERIALS

Southwestern Pipe Joint & Engineering Co.

1108-10 North Fifth Avenue **Birmingham, Ala.**
Factory Shipments From Passaic, N. J.

Buyers' Reference Index

See page 121 for advertisements of these products

LAUNDRY EQUIPMENT
W. E. Lamneck Co.
LAVA BURNER GRIDS
American Lava Corp.
LAVA PILOT TIPS
American Lava Corp.
LINING—REFRACTORY
(See Refractory Linings
LIQUEFIED PETROLEUM GASES
Philfuels Co.
LOCKERS
Remington Rand Co.
LOOSE LEAF EQUIPMENT
Remington Rand Co.
LUGS—SOLDERING
Wolverine Tube Company.
LUX MATERIAL
Alpha-Lux Company.
LUX SPONGE
Alpha-Lux Company.
MANILA AND WIRE ROPE
C. W. Hunt Co., Inc.
MANOMETERS
American Meter Co.
Brown Instrument Co., The
Precision Thermometer & Instrument Company.
MANTLES
Welsbach Company.
MASKS—GAS
Safety Gas Main Stopper Co.
MAST & GAFF OUTFITS
C. W. Hunt Co., Inc.
MEASURING CHUTES
C. W. Hunt Co., Inc.
MECHANICAL GENERATORS for Water Gas App.
United Engineers & Constructors, Inc.
The Western Gas Construction Co.
METER CONNECTIONS
American Meter Co.
Bartlett-Hayward Co.
S. R. Dresser Mfg. Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Superior Meter Co.
METER REPAIRING
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
METER TESTER, Hydro-Pneumatic
American Meter Co.
METERS
American Meter Co.
Brown Instrument Co., The
Pittsburgh Equitable Meter Co.
Air
Brown Instrument Co.
Connersville Blower Co., The
The Gas Machinery Co.
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.
Artificial
American Meter Co.
Connersville Blower Co., The
Lambert Meter Co.
The P. H. & F. M. Roots Company
The Sprague Meter Co.
Superior Meter Co.
Demand
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
Lambert Meter Co.
The P. H. & F. M. Roots Company.
Superior Meter Co.
Demonstration
District
American Meter Co.
Connersville Blower Co.
Dry
American Meter Co.
Connersville Blower Co.
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
Exhibition
American Meter Co.
High Pressure
Natural Gas
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
Oil
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
The Gas Machinery Co.
Orifice
American Meter Co.
Positive
The Sprague Meter Co.
Prepayment
American Meter Co.
The Sprague Meter Co.
Superior Meter Co.
Proportional
The P. H. & F. M. Roots Company.
Rotary Displacement
Station
Connersville Blower Co.
American Meter Co.
Brown Instrument Co.
Connersville Blower Co., The
The P. H. & F. M. Roots Company
The Western Gas Construction Company.
Steam
American Meter Co.
The Gas Machinery Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company
Test
American Meter Co.
The Sprague Meter Co.
Superior Meter Co.
Wet Test
American Meter Co.
METER LEATHER
American Meter Co.
Besse, Osborn and Odell, Inc.
MILLER GRIP PACKING
Connelly Iron Sponge & Governor Co.
MIXERS, GAS
Robert-Gordon Appliance Corpn.
Semet-Solvay Engineering Corp.
Smoot Engineering Corp.
MOISTURE DETERMINATORS
United Engineers & Constructors Inc.
MOTORS, AIR OR GAS
Connersville Blower Co.
MOTOR CARS
C. W. Hunt Co., Inc.
NAPHTHALENE EXTRACTORS
Bartlett-Hayward Co.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Western Gas Construction Company.
OFFICE FURNITURE
Remington Rand, Inc.
OIL HEATERS
Andale Co.
ORE, CHROME
E. J. Lavino & Co.
General Refractories Co.
Quigley Furnace Specialties Co.
ORIFICE METERS
American Meter Co.
OVENS (BAKERS)
The Bruce McDonald Co.
Geo. D. Roper Corp.
Improved Equipment
OVENS, COKE AND GAS
Russel Engineering Corpn.
Indugas, Inc.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
The Western Gas Costruction Co.
OXIDE
Alpha-Lux Company.
Connelly Iron Sponge & Governor Co.
Gas Purifying Materials Co., Inc.
E. J. Lavino & Co.
OXYGEN
Linde Air Products Co.
OXYGEN AND HYDROGEN METERS
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
PACKING
Asbestos
Safety Gas Main Stopper Co.
PAINTS
Cheesman-Elliott Co.
Inertol Co., Inc.
Quigley Furnace Specialties Co.
The Stacey Mfg. Co.
Wailes Dove-Hermiston Corp.
Metal Protective
Semet-Solvay Co.
PAINTS, ANTI ACID AND ALKALI
Cheesman-Elliott Co.
Quigley Furnace Spec. Co., Inc.
PAINTS, RUSTPROOF
Cheesman-Elliott Co.
Inertol Co., Inc.
Quigley Furnace Spec. Co., Inc.
PHOTOMETERS
Connelly Iron Sponge & Governor Co.
PILOTS-SAFETY
Time-O-Stat Controls Co.
PIPE
Waylow Pipe Co.
Hedges-Walsh-Weidner Co.
National Tube Co.
The Stacey Mfg. Co.
United States Pipe & Foundry Co.
The Western Gas Construction Co.
Bell
American Meter Co.
Semet-Solvay Engineering Corp.
McWane Cast Iron Pipe Co.
Bell and Spigot
U. S. Cast Iron Pipe & Foundry Co.
Cast Iron
Southwestern Pipe Joint & Eng Co.
McWane Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Found-- Co.
Flange
Semet-Solvay Engineering Corp.
U. S. Cast Iron Pipe & Foundry Co.
Screw Joint Cast Iron Pipe
McWane Cast Iron Pipe Co.
Seamless Steel
Pittsburgh Steel Products Co.
Spigot
McWane Cast Iron Pipe Co.
Semet-Solvay Engineering Corp.
Naylor Pipe Co.
Steel
Bartlett-Hayward Co.
Cruse-Kemper Co.
The Gas Machinery Co.
Naylor Pipe Co.
National Tube Co.
Pittsburgh Steel Products Co.
Riter-Conley Company.
Semet-Solvay Engineering Corp.
Spiral Welded Pipe
Naylor Pipe Co.
Welded Steel
Bartlett-Hayward Co.
Cruse-Kemper Co.
The Gas Machinery Co.
National Tube Co.
Riter-Conley Company.
Semet-Solvay Engineering Corp.
PIPE COATINGS
Quigley Furnace Specialties Co.
Wailes Dove-Hermiston Corp.
PLANTS—GAS, COMPLETE
The Gas Machinery Co.
Improved Equipment-Russell Engineering Corp.
The Koppers Construction Co.
Philfuels Co.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company
PLATES
Cruse-Kemper Co.
C. W. Hunt Co., Inc.
The Stacey Mfg. Co.
The Western Gas Construction Company.
Floor
Gas Engineering Co.
The Gas Machinery Co.
Riter-Conley Company.
The Stacey Bros. Gas Construction Co.
United Engineers & Constructors, Inc.
PLUGS, SERVICE AND MAIN
Rubber
Safety Gas Main Stopper Co.
Soft Wood
Safety Gas Main Stopper Co.
PORTABLE TEST METERS
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
PRODUCER GAS PLANT
Gas Engineering Co.
The Koppers Construction Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.
PRODUCER GAS STEAM
American Meter Co.
PROVERS—Critical Flow for H. P. Field Testing
American Meter Co.
PROVERS—METER
American Meter Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Superior Meter Co.
PUMPS
Drip
American Meter Co.
The Gas Machinery Co.
Lambert Meter Co.
D. McDonald & Co.
Geo. D. Roper Corp.
Gas
Connersville Blower Co..
The P. H. & F. M. Roots Company.
Geo. D. Roper Corp.
Gas Bag
Safety Gas Main Stopper Co.
Hand
American Meter Co.
Lambert Meter Co.
Safety Gas Main Stopper Co.
Oil
Connersville Blower Co., The
The Gas Machinery Co.
The P. H. & F. M. Roots Company.
Power
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
Geo. D. Roper Corp.
Pressure
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
Service
American Meter Co.
Lambert Meter Co.
Superior Meter Co.
Service Cleaner
American Meter Co.
Lambert Meter Co.
Safety Gas Main Stopper Co.
Superior Meter Co.
Tar
Connersville Blower Co., The
The P. H. & F. M. Roots Company.
Geo. D. Roper Corpn.
Water
Connersville Blower Co., The
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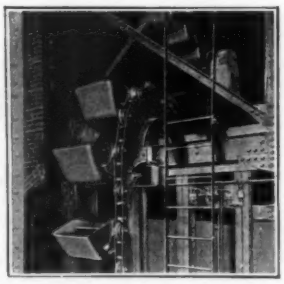

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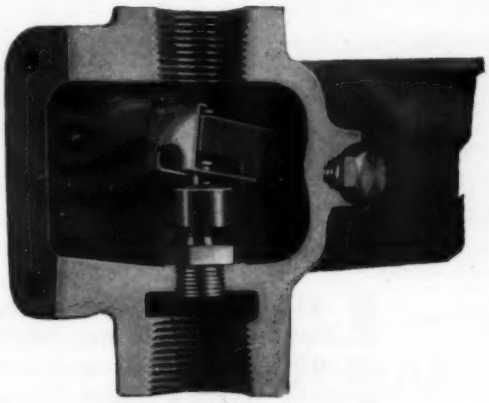

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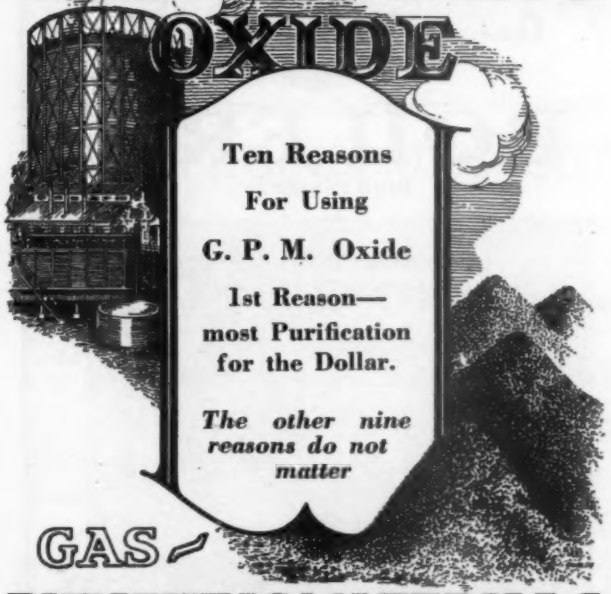

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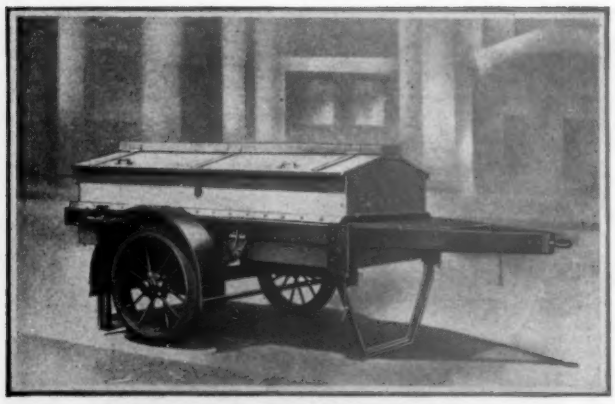

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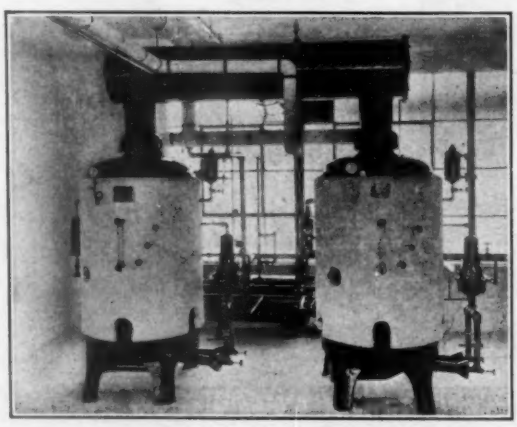

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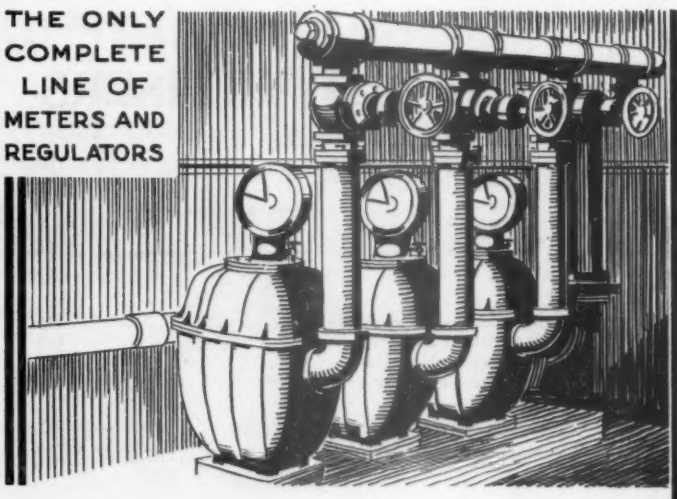
THE ONLY COMPLETE LINE OF METERS AND REGULATORS



FOR MEASUREMENT IN THE FIELD -EMCOS

EMCO large capacity meters with combined record gauges are particularly suited for measurement in the field.

All moving parts are mounted on one removable casting, the valve plate, making it easier to make repairs in the line. Rolling type diaphragm, patented tangent and valve movement, interchangeability of all parts, diaphragm drains, one piece case construction; all these are features that result in accurate measurement.

EMCO PRINCIPLES

One Piece Case Design · Rugged Beyond Compare
All Moving Parts on Removable Casting
All Parts Interchangeable
Rolling Type Diaphragm

EMCO METERS AND REGULATORS

PITTSBURGH EQUITABLE METER COMPANY

Main Office and Works—Pittsburgh, Pa.

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Avoid the HAMMER-HAMMER-HAMMER- on the Hard Highway

IT isn't the cost of new pipe that makes replacements so expensive but the cost of hammering at hard pavements to get at the pipe buried beneath them. Permanent pavements on busy streets and roads are the general rule and they are very expensive to cut and to replace. Anything which will reduce the number of repairs will save large sums of money.

The practise of burying pipe without a *proven* protective coating invariably causes trouble. Soil reagents are always present and moisture assists them to corrode the metal. Eventually every unprotected buried pipe will fail from corrosion, if from nothing else.

Bitumastic Enamel applied to the pipe surfaces by dipping or brushing protects the metal from all contact with corrosive elements. It surrounds the pipe with a tough, dense, tenacious and unchangeable armor which indefinitely prolongs its useful life. For forty-three years it has been used for every conceivable kind of buried pipe and its record of perfect protection is convincing proof of its ability to prevent corrosion.

Send for a copy of "The Protection of Oil and Gas Lines" and Bulletin 272 which describes a simple, cheap method of applying ***Bitumastic Enamel*** to services and other small diameter pipe.

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Bridgeport, Conn.